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HEALTH, SCIENCE AND VIVISECTION*

BY JOHN B. DEAVER, M.D.†

THERE is no period in history in which the subject of public health has received the attention it enjoys today. As a natural corollary to this it may be truthfully said that this is the healthiest period mankind has ever known. We are apt to accept these facts without giving much thought to the steps that led up to this gratifying state of affairs. It occurred to me that it might be of interest to trace in brief outline these various stages as they pertain to, and are combined in, the subjects of Health, Science and Vivisection.

That medicine is a progressive science is self-evident, for in the vocabulary of science there is no such thing as stagnation. We must either advance or go backward. This applies likewise to every phase of active life. The business methods of our forefathers would find little success today, nor would the housekeeping of our grandmothers suffice for the housewife of today. Indeed, the modernization of household methods is an essential factor in the cure of that universal malady, servangitis. In educational matters, also, it is a far cry from the little red schoolhouse to our imposing public school and college buildings, both externally and internally, as regards physical equipment and educational facilities. Whether these changes have always been for the best is a matter of opinion, but all must agree that in the long run the progress has been advantageous, and that the one object that makes all these endeavors kin is the betterment of the human race. Unlike the progress in the physical sciences and the arts of engineering and of industry, the forward step of the medical sciences was a slow one until it received its remarkable impetus in the middle of the last century from the discovery of anesthesia and the rise of the biological sciences. The advances made since then have been greater than in all the preceding centuries of history.

From the public health point of view the first concerted movement in this direction was the discovery by Jenner, in 1796, of vaccination for smallpox. Although this originated in a country tradition that dairy maids who contracted cow pox through milking cows were never afflicted with smallpox, Jenner, by his experiments on the human subject, established vaccination as a practical "prophylactic principle". While it is generally admitted that Jenner's work was based less on scientific investigation than on empiric observation (amounting, it is true, almost to genius), nevertheless it laid the foundations for the principles of immunization and the sciences of serology and serotherapy so indispensable for the control of communicable diseases and medical progress in general. Smallpox was formerly accepted to be as inevitable an event in one's life as love and death. Today an attack of smallpox is the tribute paid to the gods of ignorance or bigotry; and an epidemic of the disease is a disgrace to the community in which it arises. Nevertheless, here and there a sufficient number of benighted individuals can be found who endeavor to oppose, and alas often succeed in opposing, this practically innocuous measure by legislation; they base their objections on a few sporadic deaths from vaccination, nearly all of which can be traced to faulty technique, and also on the comparatively rare case of post vaccinal encephalitis, and they cherish an antiquated notion that compulsory legislation of this kind interferes with personal liberty. I venture to say that the distorted vision of these same individuals fails to see any interference with personal liberty in the piece of legislation under which we are laboring at this time, with its devastating effect on the moral health of our citizenry and its confusion of right and wrong.

As I have said, from Jenner's empiric work originated the science of immunology to which we owe the control of one infectious disease after another, and which more than any other thing has changed the concept of medicine from cure to prevention. It is true that the better part of a century passed before the discovery of bacterial infection by Pasteur provided the scientific principles on which immunology rests, but once established, they developed at a steady pace, so that today we are provided with prophylactic measures against rabies, tetanus, syphilis, diphtheria, tuberculosis, typhoid fever, scarlet fever, anthrax, cholera, malaria, yellow fever, etc. I need scarcely tell you that the progressive control of these diseases would not have been possible without experimental research, which means animal experimentation. Here again the benighted obstructionist is at work to stay the hand of the humanitarian. A remarkable outcome of this warfare against preventable disease is the development of diagnostic and sus-

*Read at Clinical Conference of the St. Louis Clinics, St. Louis, Mo., June 9, 1930.

†Deaver—Surgeon-in-Chief, Lankenau Hospital, Philadelphia, Pa. For record and address of author see "This Week's Issue", page 647.

ceptibility tests, such as the Wassermann test for syphilis, the Schick test for diphtheria and the Dick test for scarlet fever. What a boon a similar test for cancer would be! What a saving of suffering and of life it would involve, for it is upon early diagnosis and of course early treatment that prognosis of this dread disease depends!

There is hope in sight. Gruskin, now working in the Lankenau Research Institute, brought with him a blood test that he has devised, which, although still in the experimental stage, has proven successful in so large a series of cases and so much more reliable than any other test as yet offered, that there is much reason for our confidence that the Gruskin test bids fair to supply a sorely needed aid in the diagnosis of early cancer. Busy brains in the same laboratory are searching for the cause of cancer. One of the vital questions in the work is the chemistry of cell division and cell multiplication. Intense study, long hours and hard work, during the past three years, are at last beginning to show results. Animals and plants were used in these experiments. We know that in beans, peas, corn, onions, paramecia, as well as in rats and mice, there is to be found a certain special form of sulphur necessary to make cells divide and multiply. This sulphur compound has been applied to assist wound healing, leg ulcers, etc., with astonishing results. Do you think that any of our patients who have had leg ulcers, of ten years' or more standing, completely healed after a short course of treatment with this compound have any regrets for the rats and mice that died in order that the patients in question might be cured of their ulcers?

We take the routine tests and their corresponding curative measures at our command as matters of course, but how many of us realize the patient investigation, the trials and tribulations that went into their consummation? For example, it took 606 different chemical compounds, thousands of trials, and many years of study before Ehrlich finally produced salvarsan as a cure for syphilis. That alone should encourage the research worker in his quest for the cause of cancer, which is now, beyond all doubt, the greatest menace to human well-being. Success in this, however, is as little imaginable as it would have been for Ehrlich without animal experimentation and without the liberal encouragement of the wealthy philanthropist who regards his wealth as a trust to be expended for the betterment of the human race, although he may not live to see the realization of the particular phase of research he is fostering.

Very few persons realize the exact meaning of the much overworked term, research. The popular idea is that it means the pursuit of some suddenly conceived notion. This is entirely false. Particularly in the medical sciences, research means a definitely asked question, a carefully laid plan for slow, successive steps in which hardly is one point gained than another question arises, for the science of observation has no limitations, and every victory achieved is but the forerunner of a new one to be attained. It means, first of all, collecting and comparing a vast array of clinical facts to find out what the problem is, correlating them with what theoretical and practical answers the laboratory has obtained, mainly from animal experiments; then planning for the progress that medicine and surgery demand. A sad sidelight of evolution is encountered when it is found that animals have not evolved up to, or have evolved away from, the exigencies of certain investigations and the human subject has to be used for the tests. Therein lies real tragedy.

One of the outstanding examples of such a tragedy is, as you all know, the heroic self-sacrifice of Lazear, Reed and their assistants in demonstrating the cause of yellow fever; their sacrifice made possible the building of the Panama Canal, the consummation of which has changed a death trap into one of the most delightful places in which to live, to say nothing of its material contribution to science and commerce. Would the obstructionist be as ready to make a similar supreme sacrifice in the interest of a better and healthier civilization? I doubt it. Does he refuse to accept the benefits of these discoveries? He does not.

Sickness has been well described as nature's experiment on mankind. It is up to man as best he can to combat these experiments so full of mystery and confusion. This warfare of science, in fact, is the only legitimate warfare, for its ultimate object is not to destroy, but to conserve life, human life and animal life as well.

In the quest for truth, philosophical thought has passed from the age of feeling, through the age of reasoning, to the age of experiment correlated with observation. This latest period, announced by Bacon in his *Novum Organum*, however, was already foreshadowed early in the 17th century by that most signal and fundamental contribution to the physiological sciences, Harvey's discovery of the circulation of the blood and his equally important demonstration that by comparative experiments on different animals the nature and working of the human body can be revealed, enabling man thus to "increase his power and happiness and wisdom and protect himself from suffering and disease".

Later on, the work of the anatomists and physiologists, particularly that of Hunter and his disciples, added greatly to our knowledge of anatomy, based, of course, on their observations on the living animal and postmortem study. The real era of experimental work, however, came with the onset of that remarkable period in medical annals, the middle of the last century, which marks the beginnings of modern medicine and surgery. This experimental era had its inception with the work of the Frenchman, Claude Bernard, who demonstrated that the phenomena of living bodies could be the subject of exact

experimental inquiry. Physiologists at this time were divided into morphologists and vitalists, the former believing in an organic principle that *determined* rather than *explained* the form and activity of human beings, and the latter that their actions were based on physico-chemical agents. Vitalism was the dominant theory, especially in medical science in France, when Bernard began his work. The way for his experimental inquiry, however, was opened by "a modified vitalism", evolved by Bernard's master, Magendie, with whom he later became associated. Modified vitalism divided the phenomenon of living beings into two classes: those which can be attributed to the chemico-physical causes and can be studied by experimental methods, and those which are dependent only on the action of a vital force and which are beyond inquiry and whose "causes mock alike our conceptions and our curiosity." Resigning himself to the mystery of the latter, Magendie threw himself heart and soul into experimental work to the exclusion of other means of inquiry. Bernard became Magendie's assistant and by his genius was soon able to strike out on a path for himself between the limitations of the vitalists and the exaggeration of the purely experimentalists like Magendie.

Besides his valuable and numerous contributions to the anatomy and physiology of the central nervous system, Bernard's signal discoveries relate to the sugar-producing function of the liver, which, together with later researches on the properties and the function of the pancreas, represent the germs of what we now know of the causation of diabetes. Bernard worked in the laboratory, indeed the simplest kind of laboratory located in a damp and low cellar, and by his observation on different animals laid the foundations on which we are still building up our knowledge of the processes of nutrition and digestion. In no other way could these and innumerable other problems that confronted and still confront us be solved.

I need but call attention to the control of diabetes by insulin, a subject familiar to each and every one of my audience, to help you realize how gradual are the steps that lead to whatever progress we have made in the improvement of health and the prolongation of life. After Bernard's revelations, the function of the pancreas became the subject of intensive research, particularly by Mering and Minkowski. It was soon discovered that complete removal of the pancreas in animals was followed by death from diabetes. This gradually led to the conclusion that there must be some part of the organ that is essential for the utilization of sugar. Patient, persevering search finally demonstrated that this function resides in certain cells, comprising what are known as the Islets of Langerhans. This was in 1889. Although investigators gave the term *insulin* to this unknown matter residing in the cells, all efforts to isolate it were unsuccessful until 1922, when Banting and Best finally triumphed and brought the substance—insulin— from its hiding place. Only diabetics who use it, and their friends and relatives who see them maintained in comparatively comfortable health by the use of this discovery, without which life would be misery and quick death a certainty and a relief, can appreciate what experiments on dogs, rabbits and other animals have achieved in this single instance.

Fortunately the experimental animal today participates with man in the blessing of anesthesia that has "decreed the death of pain". Moreover, it is well to remember the term "vivisection" is not entirely accurate. Not all investigations are cutting operations. Most experiments are inoculations, which are painless. It has been well said that "animals kept for inoculation, on the whole, suffer less pain than in the struggle for existence in their natural surroundings or under certain working conditions". Likewise, many tests for the standardization of drugs have to be made on animals, and animals must be used for the preparation of vaccines, bacterins, antitoxins, etc. Can anyone imagine what would be the state of public health without these admirable adjuncts to diagnosis and treatment?

Animal experimentation is so intimately bound up with the economic and social structure of life that it would be impossible merely to make a list of its numerous ramifications. Take only one example, the control of infectious diseases of animals. This has not only spared dumb creatures untold suffering, but has been of inestimable value in the life of the farmer, the dairyman and other animal industries. It means reduced losses, increased production, cheaper food and wearing apparel, to say nothing of the saving of human life from only one of the animal infections communicable to human beings, tuberculosis.

Naturally, my personal interest is aroused by the contributions of animal experiment to the advances of surgery. Here likewise the list is a long and impressive one. I have no hesitancy in saying that the curriculum of every medical school should, by right, include a course for senior students of operative surgery on animals. This, to my mind, is an essential and proper preparation for the practice of medicine in general and particularly for the student who contemplates shouldering the responsibilities of human surgery. Personally, if I should have to be operated upon, I would prefer the surgeon who has gained his technique by working on a large number of animals than one who has had a limited experience in operations on the human subject. I am sure that many of you agree with me. Indeed, I would have every intelligent man and woman in this audience and elsewhere give this subject serious thought, because even though some medical schools have such a course, there are many others who would gladly institute the

work, but are hampered by the state laws that forbid the use of dogs as experimental animals. The responsibility for such limitations, therefore, rests upon those legislators who, either through ignorance of the value of experimental work or for political reasons, are willing to check the further progress of the medical sciences and turn a deaf ear to the benefits to themselves and their fellow beings that accrue from legitimate experimental work.

Before proceeding to enumerate a few of these advances, let me say that when experiment requires a cutting operation, the animal enjoys not only the benefit of anesthesia but also the same aseptic precautions as does the human subject on the operating table. Indeed, under any other conditions the experiments would be valueless; the operation cannot be properly done unless the animal is quiet and relaxed and the results would be vitiated if the wound became seriously infected. In surgery, where would we be if we had not learned from our study on animals the life-saving operations that are almost daily occurrences, such as the removal of the thyroid gland or of a diseased kidney; the wonderful operations on the brain, the bones, and even the heart; and last but not least, the surgical treatment of various diseases of the stomach and intestines.

When, in 1876, certain German surgeons experimented on the stomach of dogs, they found, to their surprise, that after removing parts of the stomach, the cut ends, when brought together, healed as kindly as any wound of the skin and, contrary to the common belief, were not digested by the gastric juice. This is the basis of the operations we now do for the cure of stomach and duodenal ulcers, and for the alleviation and oftentimes the cure of cancer of the stomach. Removing an inflamed appendix or a diseased gall bladder is a common occurrence and has snatched many a life from the hands of death. Without experimental work on animals we would still be accepting the morbidity and the mortality of these conditions as "visitations of Providence". In former days a woman with ovarian or uterine disease led a life of chronic invalidism, ending in a lingering death. Today, as the result of experimental research, the removal of diseased pelvic organs has restored numerous mothers to their families in health and comfort. Formerly a person with a strangulated hernia was doomed to death unless operated early. Today we can save some late cases because animal experimentation has taught us that death results from the poisons absorbed from the bowel, which is temporarily paralyzed, and that life can be saved by opening the bowel above the strangulation, allowing the septic contents to escape and restoring the bowel to its normal condition. Thus I could go on indefinitely.

Since the inauguration of antisepsis and asepsis, for which animal experimentation was indispensable, the progress of surgery has been astounding. Besides opening up the abdomen to the surgeon it has also made way for rapid strides in the surgery of the brain, the heart, the lungs, and the esophagus. Tetanus after operation, or even after accidents, can be avoided; compound fractures, which formerly had a death rate of about 60 per cent., now enjoy almost 100 per cent. recoveries, the mortality being about one per cent. Blood transfusions have saved innumerable lives, doomed to perish from hemorrhage.

Of what achievements can the enemies of experimental investigation boast? Have their efforts saved any lives, banished or reduced any disease, added to the progress of commerce and industry? What they have done is to cause hundreds of thousands of dollars to be employed in a campaign of vituperation and misrepresentation that might be put to infinitely better use for the health and happiness of their fellow men.

In conclusion, let me say that national prosperity means not only wealth but health—moral and physical health. Both are dependent on research. Let us thank the Lord who gave man dominion over animals and let us be grateful for the men and women who, using the animals in mercy and kindness, are devoting their best efforts to gain and to broadcast the new knowledge on which depend the happiness, the welfare and the progress of mankind.

SOME EFFICIENCY PROBLEMS IN APPLIED SURGERY*

BY ERNEST L. HUNT, M.D.†

FOR an occasion so momentous to an individual as this, wherein an opportunity is accorded which comes to him but once in a professional lifetime, the choice of a subject is a serious matter. If one is to reciprocate the honor bestowed upon him, the subject must not only be of interest but should be one upon which the author has information at first hand likely to be of some use to his hearers and conveyed in a manner to insure it a pleasant reception.

I am quite aware that modern surgery has, by its achievements, won the respect of most erstwhile sceptics and needs no apologist, but I premise my hope for your interest on the fact that all of you either operate or refer your patients for operation at need; my hope that I

*Annual Oration before the Worcester District Medical Society, May 14, 1930.

†Hunt—Director, Division of Surgery, Worcester City Hospital, Worcester, Mass. For record and address of author see "This Week's Issue", page 647.

have information of some little usefulness upon the fact that I have amused myself for the past 10 years in trying to detect the curable imperfections of surgery; my hope of a pleasing impression upon the historic good-nature of this well-fed group of doctors.

As my approach to the field of surgery was through the laboratory and postmortem room, I arrived with as wholesome a respect for its harmfulness as admiration for its beneficence. I also had a conviction that average surgery did not live up to the standards set by the masters in their home clinics.

Since 1914-1916, when Dr. E. A. Codman so fearlessly challenged the established customs and practices of hospital government and proposed his system for measuring the efficiency of surgery by auditing the cases according to both the immediate and final outcome, there has been tremendous expansion in the surgical treatment of disease, and in the growth of hospitals the world over. Hundreds of young men have entered the field of surgery, some to attain eminence, but more like myself, to fill routine hospital positions and follow the leaders as our gifts and opportunities permit.

Dr. Codman was in advance of his time. The force and logic of his contentions, at first perceived by a few, have since gained wide acceptance. From diverse sources in increasing volume and strength have come approval and further contributions toward clearer ideals and new ethical standards based upon the general concept that the art of surgery is a precious trust to be administered by the hospitals and surgeons for its rightful beneficiaries, the patients, and that honest and complete study of end-results is the fairest measure of their faithfulness to that trust.

All of us have reason to be grateful to the American College of Surgeons for taking up the cause and, by guidance and pressure of enlightened public opinion, bringing a majority of the hospitals to a minimum standard of ethics and equipment. This great thing having been accomplished, the challenge is now to the surgeons so to apply their art that a maximum of benefit and a minimum of harm shall accrue to their patients. This sounds axiomatic, but it is clear that unless methods for ascertaining and recording end results exist and are honestly practiced, the claim by any hospital that patients receive the best possible surgical care may express good intention but is not based on measured accomplishment.

At the present time the knowledge of surgical technique is so widely diffused that young graduates do with ease and safety many operations of the types upon which great reputations were made by the surgeons of an earlier day. The unique and wonderful of yesterday is the commonplace of today.

But the relative safety bestowed upon operative procedures by modern aseptic technique has become of itself a danger in that a little training in the operating rooms is too often considered to be the making of a surgeon and even those of experience and skill are tempted into unexplored fields.

Neither the general public nor, at times, even hospital trustees discriminate too carefully as to the qualifications of those to whom they entrust the responsibilities of surgery nor limit their range of activities to fields in which they are known to be skilled.

Since most of the surgery is now done in hospitals, it is impossible to discuss applied surgery apart from the vehicle through which it functions. The surgeon and the hospital are in partnership, he to furnish the diagnostic ability, judgment, directing care of the patients, manual skill and legal responsibility, while the institution furnishes the organization for board and nursing care, technical assistants in operating rooms, laboratories, etc. In earlier days, hospitals were built around personalities and reputations. Nowadays the hospital is the larger power in the partnership and the surgeon is but one element in the organization—important indeed but always replaceable in any adequately organized institution.

Every institution has the duty of protecting its patients from incompetence; therefore it should recognize its responsibility to the future and provide for the systematic development of the younger surgeon through training and experience properly supervised and graded to his progress. Limitation of opportunity to the surgeon's demonstrated experience and skill is essential to the safety of patients. It should, however, be predicated upon a systematic course of training to develop the skill and judgment required.

Hospitals, of course, differ in type and in the character of the work they do. I speak from the point of view of one trained and experienced in the general hospital maintained by a municipality primarily for the treatment of the poor, though the evolution of hospital service has somewhat altered that conception. Today Worcester City Hospital serves all strata of the population, but the majority of its surgical cases are found in the general wards and receive their surgical attention without having to pay the full cost of board and care, and but rarely a surgeon's fee. Obviously the character of the work differs materially from that found in private or endowed clinics. Severe traumatisms, acute emergencies of all kinds, surgical conditions in persons having constitutions undermined by hard living conditions or alcohol, belated malignancies and the aged prostatics fill a large percentage of our beds. I desire to make it perfectly clear that I would not feel free to present and discuss the results of my studies at Worcester City Hospital did I not feel assured that our problems are those of surgery and of hospitals of similar type everywhere.

The functions of such a hospital I conceive to be primary, or clinical, and secondary, or educational. Its primary concern is to afford a refuge to those suffering from bodily ills wherein they will find rest, sustenance, competent nursing care and all resources of medical science to restore them to well-being and productivity. The hospital's job is not done until the maximum of possible health is secured and the patient back at work. No other function of the hospital can be allowed to interfere with or detract from this one.

The secondary functions are: (1) The advancement of medical science through research; (2) the education of the staff through study, experience and practice; (3) the training of young men in both clinical and administrative fields; (4) the training of young women and a few young men as nurses, technicians, and hospital librarians; (5) the education and guidance of the public in general health matters and the dissemination of information upon the developments of medical and social sciences.

With the possible exception of the last, all these secondary functions are vital to the maintenance of the primary function. The highest expression and most searching test of an institution's efficiency in the execution of its primary function is its success in applied surgery. As a premise no one will deny the promotion of efficiency to be an object worthy of much attention, study, experimentation and care. It is when we get down to specific details that we run against obstacles of which prejudgment and the human tendency to denounce without trial are outstanding examples.

To determine the degree of efficiency with which any machine functions it is necessary to measure both the quantity and quality of its output and if part of it is found imperfect, it is necessary to inquire into the reasons. Is it a defective part, a wrong adjustment; is the operator unskilled, or the material of poor quality? Unless imperfect products can be eliminated, profits will be cut and in the business world that is the unforgivable sin.

So in applied surgery it is more useful to study the reasons for failure than to acclaim success. We must get the habit of regarding complete success as the normal. Failure to attain the normal is the defect which calls for attention and upon its causes our best investigative efforts should be focused. Nothing short of complete explanation should satisfy either surgeon or administrator.

The hospital affords the ideal laboratory in which to study the problems of surgery. We may properly regard every operation as a physiological experiment because the outcome is influenced by so many factors as yet intangible and not wholly under our control. A person of enquiring mind seeks to solve his problems by first-hand objective study. While ever alert to profit by the solutions worked out by others, he does not rely wholly upon others to solve his problems for him. Surgical material in Worcester is no less valuable for research than that in Minnesota. We must not expect the Mayo Clinic or the Massachusetts General, or Johns Hopkins, or any other group to do our thinking for us, competent as they are. Though we strive to follow the masters in what they have proven to be good, our own results should be the index of our success in applying their teachings.

Dr. Codman of Boston, Drs. Ward and Poole of New York, Drs. Vaughn and Ponton of Chicago, and others, have presented, at various times, well thought out attitudes toward those surgical end results which do not measure up to the standard of complete success. All substantially agree that unsatisfactory results are to be considered as errors of applied surgery. They may be errors of diagnosis, of preoperative estimation of the risk, of x-ray interpretation, of laboratory findings, of judgment as to time to operate or choice of operation. The error can be in technique, either operative or in aseptic preparation. The referring doctor or service, the surgeon or his assistants, the roentgenologist or pathologist, the nursing service, even the administration, may contribute to the error. Death may result through the unconquerable nature of the disease, from complications dependent upon any of the above errors, or from new pathology contingent upon the operative traumatism, technical difficulties encountered, or adventitious infection. To reveal such causes in all unsatisfactory cases so as thereafter to avoid them is the ideal of an end-result system.

The cumulative impressions of a large experience have been thought to create wisdom and we all rely at times upon those of mature experience to guide us in our clinical decisions. But the limitations of human memory and the bias of judgment which results from individual and exceptional experiences is well known so that if we would be guided by facts rather than impressions we must recognize from our own truthfully recorded and carefully analyzed experience what the actual facts are.

In order to have such facts available to serve our need and purpose, machinery for recording, classifying and revealing them must be part of every hospital's equipment. At Worcester City Hospital it consists of the clinical records, a surgical rating, and a follow-up system. These merit a brief description that their application to surgical problems may be better understood.

(1) THE RECORD SYSTEM

Clinical case records have been kept since October 26, 1871. They were filed in book form up to 1920 and contain much valuable material, which, however, lies buried and inert because the treasure-house lacks a key. Since 1920 a unit system has been in use and the individual records are filed numerically and are made accessible by a classified cross index of diseases on

cards devised by the writer and sold by the Library Bureau under the title "Worcester City Hospital Cross Index." They carry both primary and secondary diagnoses, using international nomenclature and numbers, with operations, if any, and whether for primary or secondary conditions, dates of entrance and discharge and condition on discharge. They have a distinctive color for each service and a numbered tab which identifies the surgeon having charge of the case. Thus they permit of approach to case records, by disease, by operation, by service and by surgeon. By referring to it one can find in a few moments what operations any of our surgeons have done, their mortality if you choose, the cases of any particular disease, the operative procedure, or the mortality rate. You may compare mortalities in any particular disease or of any particular operator by year, or one operation with another and so on.

This index is available to any member of the staff who files a request and will submit his findings to the administration before publishing or otherwise communicating the same. Of course name index cards filed alphabetically are also kept.

THE SURGICAL RATING SYSTEM

In 1919, after a visit to the great clinics of Chicago, Rochester and New York City, I returned to Worcester City Hospital where important staff changes had taken place or were impending and was assigned the duty of organizing the clinical work and staff activities to comply with the minimum standards of the American College of Surgeons. This position was understood to be something of an experiment in hospital administration and few precedents were available for guidance. The work and methods of Dr. George Gray Ward at the Woman's Hospital in New York had impressed me as being applicable to our type of institution. Accordingly, I devised a slight modification of his plan to fit our needs, "sold" the idea to the trustees and staff as a means of gauging our immediate results and finally checking up with those found by recalling, questioning and examining the patients after the lapse of one year.

The Codman summary cards, each of which carries a brief of a clinical record, are the basis of this part of the system. They are filed by services and by months, so are readily available for timing the follow-up letters and clinics.

The method is simple and rather sketchy but involves as much as I could reasonably ask of my colleagues and the clerical help available. My associates of the staff have been very indulgent, however, and in spite of its imperfections, I feel that I can show tangible results from the work it has required.

Briefly, it consists in six specific ratings, one of which is awarded to each operative case on discharge. They are indicated upon the summary cards, to which distinctive riders are attached, and tabulations of the ratings are made monthly. It has served to single out the imperfect results and to classify them somewhat according to causes of the lack of success. Its greatest service up to the present has been to separate the deaths due to the patient's unconquerable disease from those due to complications or hazards introduced by the operation itself. The former we rate as "failures", the latter as "operative deaths."

Each surgeon rates his own cases and reports them in open staff meeting, where his own estimate is sometimes revised by the rest of the group. Surgeons differ somewhat in their attitude toward the system, some tending to rate their results over-severely, while others are rather indifferent to it. None, however, fear to have their work scrutinized and, so far, we have been able to avoid unpleasant reactions by the palpably fair, clearly impersonal and scientific manner of applying the system. It is primarily and purely a system for bringing defects to light and is directed wholly toward bettering the quality of our work and not at all to the damaging of reputations.

The first important fact brought to light was an amount of superficial wound sepsis which had caused a very considerable increase in the number of patient-days chargeable to various clean operative cases. Experiments in sedimentation of bacteria, and studies of the efficiency of sterilizers and of operating-room crowding brought about a complete renewal of the battery of sterilizers, the purchase and installation of sterilizers in other parts of the hospital to take the load off the ones in the surgery, the enlargement of the surgery, first by removing a tier of seats in the amphitheatre, secondly by removing the accident and admission service to another part of the institution, and the rearrangement of the office and dressing room so that no one need enter the operating rooms until he has removed street clothing and put on a clean linen frock. Iodine preparation of the skin was discontinued in favor of picric acid, doing away with iodine burns and improving asepsis at the same stroke. In spite of all this, wound sepsis is not wholly eliminated; is, however, a lessened factor in postoperative morbidity.

Its second contribution was its revelation of a fairly constant level in the incidence of those complications which bring about the calamities of surgery, the results of which we include in the rating "operative death." Last fall, I made a study of the surgical death rate for the American College of Surgeons and found that in the five years 1924-1928 inclusive, of the 13,436 cases operated upon there were 468 deaths, a mortality rate of 3.5%, of which 102, or 0.74%, were classed as operative deaths. These figures are important because they fix the operative hazard as .7 of 1% or 1 to 135.

I can safely assert this figure is not in excess

of other institutions of similar character, since statistics from many sources have shown that deaths from postoperative pneumonia alone are at least 1-200. A comparison made in 1922 of our mortality rate with that of several other well-known institutions from figures published in their own annual reports showed that the gross surgical mortality of the Charity Hospital of New Orleans, the Childrens' Hospital and the Peter Bent Brigham Hospital of Boston exceeded that of the Worcester City Hospital, while that of the Massachusetts General, Grace Hospital of Detroit and Union Hospital of Fall River were less. As our rate has steadily fallen since 1924, I feel sure that we have maintained or improved our situation in this comparison. Moreover, the accident-room operations are not counted in our mortality figures otherwise the rate would be much lower.

If, now, you will grant that our mortality rate is a fair average and that our ratio of operative calamities to the gross death rate (1:5) is also average, you may roughly compute the annual "operative death" rate for the continental U. S. by applying this figure to the number of patients occupying surgical beds as shown by the "Hospital Number" of the *A. M. A. Journal.* In 1922, I estimated that 10,000 lives per year were sacrificed in the attempt to regain health through the medium of surgery—a figure about equal to that for homicides for the same period, and although the homicides have increased until they now amount to about 14,000 per year, I have no doubt the comparison still holds. I think, and you probably agree, that the comparison is a bit odious. I excuse the use of it only in the hope that it will make emphatic a situation which I believe can and will be much improved. Here is a list of the causes in fifty of our cases rated as "operative deaths":

Apoplexy	2
Cardiac failure	5
Hemorrhage, immediate	2
Hemorrhage, secondary	2
Ileus, paralytic	4
Lung—Abscess	1
Lung—Embolism	6
Lung—Pneumonia	8
Peritonitis	3
Renal insufficiency	3
Shock, surgical	6
Thrombosis, mesenteric	1
Toxemia, pregnancy	1
Wound infection	3
Wound reopening with shock	1
Wound reopening with peritonitis	2

Many of these causes we regard as preventable and could such prevention be everywhere 100% effective, it is clear that several thousand lives would annually be spared. With the knowledge we now have, wound infection, hemorrhage, surgical shock, and peritonitis following laparotomies seem particularly inexcusable, yet they recur with such regularity as to lead one to wonder if surgery has yet attained ultimate perfection of aseptic technique.

Of course, we all think we are doing the best we know all the time; but may we not, by the intensive application of modern research methods upon these relatively commonplace problems, learn how to do better?

At Worcester City Hospital a 16% drop in the death rate from these causes has been achieved in 1929 over that of 1924. (See Table 6.)

So much to show that in the accountability for lives lost through applied surgery urgent problems exist and have been brought to light by our Surgical Rating system. I will later show that definite progress has been made in their solution.

THE FOLLOW-UP CLINICS

The follow-up system has for its object the determination of how successful our work appears after the lapse of a year by finding what morbidity ensues that is causally related to the operation or its failure. We are after a measure of surgery as a therapeutic agent rather than its brilliance as a handicraft. I cannot but regret that the opportunity to present this phase of the study did not wait until 1932, when figures for the full decade would have been available. The comparison of the second half with the first would then have been possible. But the figures involved are large, the mechanical task of analysis is great, so I am obliged to content myself with presentation of general figures and a detailed analysis of one group of cases to show the possibilities of the method and the wealth of information which lies ready at hand in the material accumulated and now largely classified for use.

The follow-up data are obtained chiefly from the clinics held in the Out-Patient Department every Sunday morning from October to May and conducted for the most part, by the surgeons who attended the patients during their stay in the hospital the year before.

In thus planning the clinics it was hoped

(1) That the heads of services, by seeing the results of their own handiwork, would derive much benefit which they would transmit to the rest through reviews of the clinics at staff meeting.

(2) That operations giving uniformly unsatisfactory results would be eliminated.

(3) That certain defects and sequelae, such as wound hernias and recurrences in malignancies, would be detected and brought in for appropriate remedy.

(4) That accurate observations would be made, permitting of later statistical studies upon the physical, economic and social value of the operations.

Not all of these hopes have been fully realized, but valuable service has been rendered to the patients by discovery of relievable conditions and to ourselves by reëducation as to what we may

promise our patients and in what directions we must strive for improvement.

The follow-up clinic notes having been made upon the back of the original summary cards, the material is at hand for analytic approach from many points of view.

It now becomes necessary to inflict you with a few figures and I will ask your attention to some tabulations which tell the story of the follow-up studies. I should like to begin with the figures which are general in their scope and give a bird's eye view of the extent of the work for the 5 years 1924-1928, inclusive.

WORCESTER CITY HOSPITAL

The Follow-Up Clinics

TABLE 1

Sundays, October to May, 1922, to date
Period studied, 1924 to 1928 inclusive

Letters sent to approximately		20,000	Postage $400.00
Number returning in person			
Post-operative	7,379		
Non-operative	1,921		
Total		9,300	
Number reporting by mail			
Satisfied	2,189		
Not satisfied	255		
Total		2,444	
Grand total responding		11,744	
Lost track of		8,256	
Second letters sent to approximately		3,000	Postage 60.00
		Cost of postage	$460.00

You will have noted from Table 1 that 7379 postoperative cases returned and were personally seen, questioned, examined and re-rated according to the degree of success achieved.

TABLE 2

SURGICAL RATINGS, CASES OPERATED UPON

	At Discharge Original	At F. U. Clinics Revised	Loss Gain
Success	6971	6597	—374
Partial Success	277	572	+295
Operative Defects	123	125	+ 2
Failure	8	85	+ 77
Total	7379	7379	

Analysis of this group shows that three hundred and seventy-four dropped out of the success rating, seventy-seven of whom struck bottom as failures while two hundred and ninety-five fell only to the partial success level. The operative defects remain numerically about as on discharge, but the type of defect has changed so that whereas those noted at discharge were mostly wound infections, those seen in the follow-up clinics were of the more permanent types, as incisional hernias, evidences of adhesions, anesthesia areas, keloid scars, etc.

In the failure group are chiefly recurrent hernias and malignancies, with scattered traumatic cases. That six thousand, five hundred and ninety-seven (6597) from seven thousand, three hundred and seventy-nine (7379), or 89.3%, were completely successful affords us a certain amount of satisfaction, but the 10.7% of unsatisfactory results is what challenges our attention and indicates the direction toward which we should bend our energies.

TABLE 3

Deaths under one year after discharge			
Return cases	178		
Elsewhere	239		
	417		3.5%
Deaths from *Causes for Which Treated*			
Cases operated upon	142		
Cases not operated upon	141		
	283	2.4%	
Deaths from *Other Causes*			
Cases operated upon	90		
Cases not operated upon	36		
	126	1.0%	
Unspecified	8	0.1%	
			3.5%
Cancer Group (Mostly return cases and carried on current mortality)			
Cases operated upon	109		
Cases not operated upon	79		
	188	1.6%	

Table 3 reveals the deaths that occurred within a year from the date of discharge so far as we were able to get information by letters, reports of physicians, published obituaries and later hospital entries. They were four hundred and seventeen in number, or 3.5% of the cases followed. Of these two hundred and thirty-two (232), or 2% of the whole, were cases in which operations were performed of which one hundred and nine (109) were for cancer. Ninety patients died postoperatively of causes other than those for which their operations were done and should be deducted to find the late postoperative mortality, which gives 1.2% as the corrected, subsequent to discharge, mortality rate. Adding this figure to the five-year average immediate mortality gives a total of 4.7%. In order to charge ourselves clearly with that portion of our work which, considered from the viewpoint of the hospital's primary function was futile, we must add in the 1.1% of failures as shown by Table 2 and the total of 5.8% stares us in the face as the measure of wasted effort—wasted except for its value to experience and education. So, likewise, we must charge ourselves with the

immediate calamity rate of 0.7% in which the operations themselves added to the patients' difficulties and were therefore harmful.

This is shown in Table 4.

TABLE 4

LIABILITY CHART

Immediate operative mortality (average)	3.5%	
Post-discharge mortality	1.2%	
End-result failures	1.1%	
Total		5.8%
Immediate postoperative calamities	0.7%	
Otherwise unsatisfactory		9.6%
		15.4%

The above general survey of the end-results is but the preface to the volume of information which may be gleaned from the stack of nearly twelve thousand (12,000) cards. We may branch off in the direction of any operation or surgical condition and pick up the details of morbidity, of success and failure. I will burden you with but a single example of such a study and take appendicitis as an example of a familiar disease, the operative treatment of which approaches standardization and is therefore a part of our product upon which a measuring stick may be fairly laid.

END RESULT STUDY OF APPENDICITIS

Table A summarizes the information obtained through the follow-up of the cases operated upon during the seven years 1920-1926 inclusive and shows 80.2% of the 1021 cases returning to the clinics to have been entirely successful and satisfactory, while 11.3 had complications and sequelae and 6.5% had developed other troubles apparently unrelated to their original diagnoses.

TABLE A

Years covered, 1920-1926 inclusive		
Cases operated upon, all types	1977	
Primary mortality	86	4.3%
Invited to Follow-up Clinic	1891	
Number reporting to Follow-up Clinic	1021	54. %
Complications, defects, or sequelae, cases (Deaths 3 = 0.3%)	116	11.3%
New symptoms and lesions unrelated to original diagnosis or operations, cases (Deaths 6 = 0.6%)	66	6.5%
Well and free from complications, defects and sequelae, cases	839	82.2%
	1021	100. %

Table B analyzes forty-five (45) cases in which incisional hernias developed. It shows clearly the important part played by drainage in the causation of this sequel while the part played by wound infection of clean cases is apparently trivial.

Table C similarly portrays the cases, 39 in all, in which adhesions were the apparent explanation of a chain of symptoms and the cause of secondary operations in six (6) cases, in one of which a fatal result ensued. In this group neither drainage nor wound sepsis was important. Thirty-four (34) of the cases were primarily clean and closed without drainage.

Table D shows two cases in which keloid developed in the scar.

Table E is a miscellaneous group of 30 cases in which either the original symptoms were unrelieved by the operations, the diagnoses were wrong or in which there were early complications, the effects of which persisted with some degree of disability.

In groups C, D and E drainage played a minor rôle or was not a factor at all. It is from the so-called chronic, subacute and interval operations that we get the unpleasant after-symptoms and the dissatisfied patients. These findings accentuate the reluctance we have come to feel toward operating upon the neurotic type of patient presenting the "chronic appendix" syndrome.

Table F.

This is a composite group of sixty-six (66) cases in which other troubles developed later and of which two proved fatal. Several of these doubtless represent errors of diagnosis. Thirty-nine (39), however, were acute cases and twenty-three (23) required drainage. Here again the part played by wound sepsis cannot be shown to have any relation to the conditions which later developed.

The lessons learned from this group are: (1) that drainage is the greatest element in the causation of incisional hernia, and suggests closer study of the indications for leaving drains in, improvement in size and type, and their removal at the earliest moment consistent with safety; (2) that greater refinement of diagnosis is desirable; (3) that operation for the vague types classified as chronic ought to be minimized.

GAINS FROM THE STUDIES

Having thus rather remorselessly hunted down the defects and shortcomings of applied surgery, it is time that I reversed the shield and exhibited its brighter side. I know you have been wondering whether the expenditure of so much effort to find the discouraging things about one's job has served any useful purpose measurable in terms of improved methods and better results. Happily I have that to show which I believe will convince you that it has not been in vain. If results have been secured, how have they have been brought about?

TABLE B

Post-operative Complications or Sequelae	Chronic and Interval Closed	Acute Closed	Acute all grades, drained	Wound infections before discharge	Deaths after discharge
Hernias, incisional					
Support advised or worn	2	2	13		
Operation advised		3	10	1	
Others	2		11		
Operation performed			2		
Total of Hernia Group	4	5	36	1	

TABLE C

Post-operative Complications or Sequelae	Chronic and Interval Closed	Acute Closed	Acute all grades, drained	Wound infections before discharge	Deaths after discharge
Adhesions, post-op.					
Symptoms, but not disabling.	15	6	5	1	
Operation advised.	4	3		1	
Operations performed for adhesions.	4				
Operations for intest. obstruction		2		3	1
Total Adhesions Group	23	11	5	5	1

TABLE D

Scars, Keloid in	1	1			

TABLE E

	Chronic and Interval Closed	Acute Closed	Acute all grades, drained	Wound infections before discharge	Deaths after discharge
Original symptoms unrelieved	15	2			
Later Diagnoses account for original symptoms	5	1			1
Early complications persistent or delayed	2	2	3	1	
Total	22	5	3	1	1

As I visualize the situation, the changes, though gradual, have been very definite. Some are intangible and are the fruit of larger experience such as more refined technique and an increased feeling of personal responsibility on the part of each member of the staff. The report of a calamity case before one's colleagues by rehearsal burns its lessons into conscious memory to remain as a warning for the future not only to the individual but to his associates.

Increased number and careful selection of interns have allowed of more care in preliminary study and more particular after-care. The real advances in protective measures have been promptly applied. Transfusions have saved a goodly number, preoperative and postoperative physiological supporting methods have advanced markedly in effectiveness and their use has been extended. Operations are not delegated to interns except under the immediate supervision and control of a surgeon. Interns no longer give anesthesias to the night emergencies until they have shown proficiency in a course of instruction upon the less critical cases.

Ether is used much less and we have learned to get along with light ether anesthesia given by the drop method instead of the profound knock-outs of earlier days. Nitrous-oxide with oxygen, local and spinal anesthesias alone or in combination are used increasingly. Routine in the use of anesthetics has been replaced by selection to meet the particular indications of the case. Better anesthesias, attention to upper respiratory tract infections, carbon dioxide ventilation and frequent change of position during the immediate postoperative period have minimized lung complications.

A helpful safeguard against the calamity of embolism has been found in a routine inquiry for symptoms with inspection, palpation and measurements of the calves of the legs before the patient is allowed to get out of bed. By this precaution silent or beginning phlebitis may be detected and by suitable care the dislodging of an embolus is avoided.

Certain operations carrying high mortalities, such as the Wertheim hysterectomy have largely given place to safer methods.

TABLE F

New symptoms or lesions unrelated to operation or original diagnoses	Chronic and Interval Closed	Acute Closed	Acute all grades, drained	Wound infections before discharge	Deaths after discharge
G. I. Tract symptoms	11	6	7	1	
Gall Bladder	2	1			
Hernias elsewhere			5		
Kidney, stones, etc.	1	3	1		
Pelvic conditions	6	3	1		1
Arthritis and rheumatism	1				
Tuberculosis, any type			3		2
Cardiac, neurological, infections, anemias, etc.	5	2	2	1	1
Throat and glands	1	1	2		
Neoplasia			2		2
Total	27	16	23	2	6

Better organization and more help in the operating rooms have contributed much to the ease, speed, and safety in the succession of operations. Improvements in equipment and methods for general aseptic technique have already been mentioned.

There is one further step in organization control to which I feel sure all large hospitals will ultimately be forced to come and to the principle of which I unreservedly subscribe. Did time permit to present analyses of some other groups of cases, I believe I could demonstrate clearly the advantage of a higher degree of specialization in regard to the operations carrying the higher mortalities of which stomach and gall-bladder surgery are examples. Not until such restrictions are imposed upon the more difficult procedures as to enable the designated operator to acquire a high degree of skill and to build up a team of coöperating specialists, can the dangers be materially lessened and the benefits correspondingly increased.

GRAPH 1

Worcester City Hospital

APPENDECTOMIES

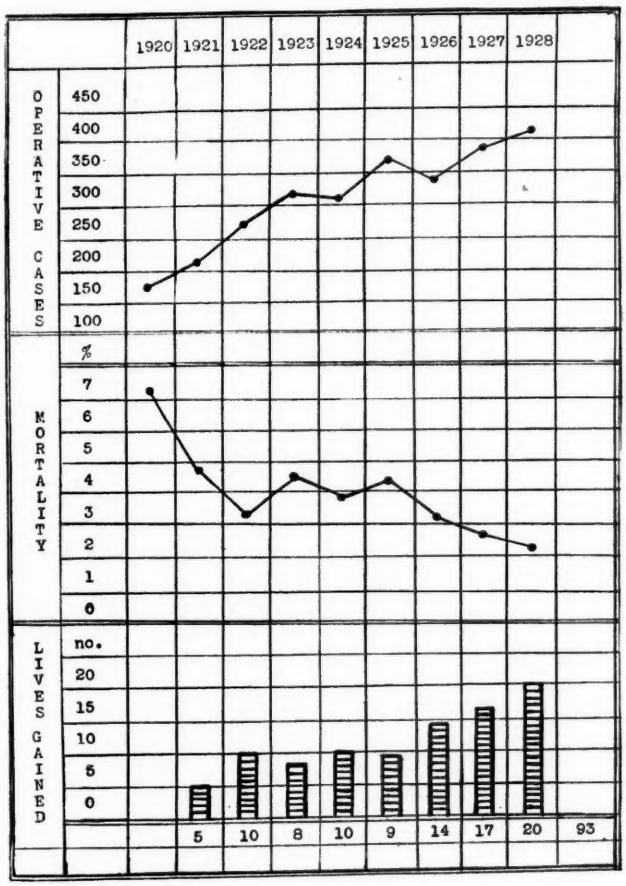


TABLE 6

WORCESTER CITY HOSPITAL

TABLE OF OPERATIVE MORTALITIES FOR 6 YEARS, SHOWING SIGNIFICANCE OF REDUCED RATES

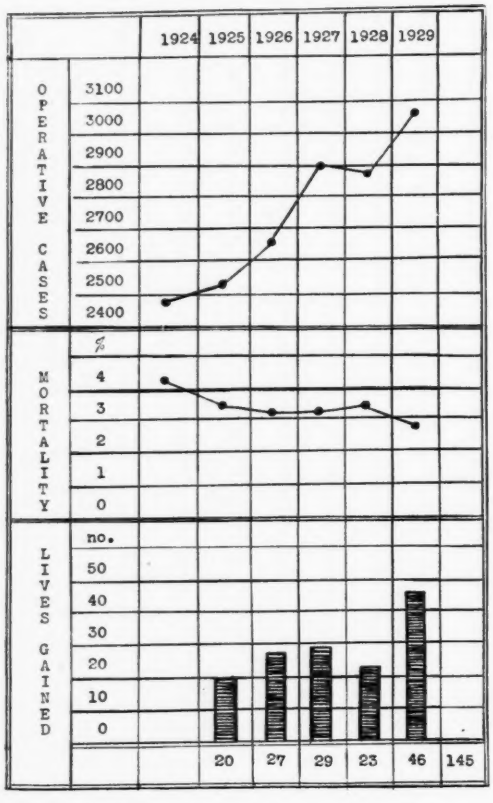
	1924	1925	1926	1927	1928	1929	Totals
No. of Patients operated upon	2488	2519	2660	2900	2869	3063	16499
Died	102	97	83	91	95	79	547
% Mortality	4.1	3.3	3.1	3.1	3.3	2.6	3.5
Operative Deaths	22	16	19	26	19	20	122
% Operative Deaths	0.9	0.63	0.7	0.9	0.66	0.74	.75
Patients theoretically "spared" by mortality reductions from 1924 rate		20	27	29	23	46	145

The advantages derived from such a plan have been clearly demonstrated at our hospital in the fields of thyroid surgery and of Caesarean section. Its extension waits upon enlightenment and unselfishness of the staff or upon a decree from the Board of Trustees.

GRAPH 2

Worcester City Hospital

Operations, All Types



Now, in confirmation of my claim that something tangible has been achieved I offer two more charts and two graphs which portray the steady increase in number of operations, a similar decrease in mortality rate and finally tiers of units piled one above the other to make columns of yearly increasing stature and representing a total of one hundred and forty-five (145) individuals who left our institution alive, but would have been counted among the fatalities had the mortality rates of 1924 persisted. Expressed in monetary equivalent, counting a single life at about age 22 as worth $30,000, this represents a capital gain to the community of $435,000. (See Tables 5, 6 and Graphs 1 and 2.)

TABLE 5

Worcester City Hospital

*Appendectomies

Year	Cases	Deaths	% Mortality
1920	167	12	7.2
1921	212	10	4.7
1922	267	9	3.3
1923	315	15	4.7
1924	310	12	3.9
1925	367	17	4.6
1926	339	11	3.
1927	375	10	2.7
1928	405	9	2.2
	2757	105	

*Appendectomies incidental to other operations not included.

In closing I desire to express my appreciation and gratitude to the trustees of Worcester City Hospital who gave me opportunity and support; to Dr. Charles A. Drew, who though overburdened with administration problems of the war and post-war period, plagued by soaring costs and many trying details, bore my importunities with infinite patience and kindliness, kept ever balanced and gave generous coöperation where his wisdom approved: to my associates of the visiting staff who have for nine years given their time gratuitously to the Sunday clinics, and by participation in staff meeting reviews and adaptation to changing methods secured the results here depicted: to the internes upon whom we have leaned very heavily; to the nurses, clerks, laboratory and social service workers who have been such vital cogs in the machinery of progress; and finally to Dr. Drew's successor, Dr. George A. MacIver, whose firm hand has consolidated the gains and may be trusted to carry on to much greater achievement.

COMPARING THE BREAST-FED AND THE BOTTLE-FED INFANT*

BY MANUEL M. GLAZIER, M.D.†

THE medical literature contains many articles comparing the breast-fed and the bottle-fed infant. The conclusions drawn usually favor breast feeding. However, the general deductions may, or may not, be based on a good foundation, for the studies did not include a detailed examination of factors which may influence the conclusions.

It is generally agreed that good breast milk is the perfect food for the infant, and any substitute for breast milk should be considered only as a substitute. This study was not undertaken to refute the above proposition, but to study and to compare breast-fed and bottle-fed infants under proper medical and nursing care, and under the same and different economic and social conditions.

According to McKay[1], breast-fed infants have a mortality of one-fifth to one-third that of bottle-fed infants, and the longer the breast feeding is continued, the lower is the mortality. Woodbury[2] agrees with McKay. Wertheimir and Wolff[3] state that breast-fed infants are ill only one-quarter the length of time that bottle-fed infants are.

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Why are these the facts? Is it because of a higher bacterial power in the serum of the breast-fed infants (as demonstrated by Moro[4]), or is it because breast milk is sterile, quickly digested, and therefore yields a greater amount of energy[5] (less demand being made upon the digestive ferments)?

The breast-fed infant is the normal infant. Breast milk is produced for the infant, and most physicians attempt to keep the infant on it as long as possible. If the breast-fed infant is satisfied and gains well, no change is made. However, under the following conditions: (a) the death of the mother at childbirth; (b) a complication of pregnancy; (c) failure of the infant to do well on breast milk; (d) "wasting disease" in the mother; (e) refusal of the mother to nurse the infant; (f) necessity of the mother to go to work; the status of the infant is changed, an abnormal condition results, and a suitable substitute food must be found.

This investigation is based upon:

(1) A detailed study of 217 infants. These infants attended well baby clinics in the North End and Roslindale districts of the City of Boston[6]. The clinics, controlled by the Baby Hygiene Division of the Boston Health Department, were conducted weekly. Home supervision of clinic infants was possible through a group of well-trained graduate nurses, who gave the mothers instructions in baby hygiene and in formula preparation.

(2) Vital statistics of 1566 infants who were followed for one year.*

The North End and Roslindale clinics are in districts of different economic, social and hygienic conditions. The North End district is the poorest district in the city. The average weekly income is twenty-five to thirty dollars. This sum maintains a family with five to seven children, living in a tenement of three to five dark, stuffy rooms, for which a monthly rental of twenty to twenty-five dollars is paid. During the year this study was made approximately one of every five families in the district received financial aid from the city at one time or other. The majority in this district are of Italian parentage, and many of the mothers cannot speak or understand the English language.

The infants in the Roslindale district have the advantage of good economic, social and hygienic conditions. The average family includes two to three children, and lives in a "flat" of four or five well lighted, airy rooms, for which an average monthly rental of forty dollars is paid. The majority of parents are of American birth.

For purposes of comparison, the 217 infants studied are divided into the following groups, based upon the type of feeding:

*I wish to acknowledge the assistance rendered by Dr. F. X. Mahoney of the Boston Health Department in obtaining these data.

Group A: Breast-fed—for three months or more.

Group B: Breast and bottle-fed—for three months or more.

Group C: Bottle-fed.

In this investigation, together with a study of vital statistics of clinic patients compared to non-clinic patients in the same district, a comparison was made between the two districts as to:

1. Nutrition.
2. Development, infection, deficiency diseases.
3. Vital statistics.

I. NUTRITION (SEE CHART I)

As a rule, infants were kept on the breast as long as possible. Artificially fed infants received "split milk" formulas. The use of cereals was advised in the fifth month and egg yolk and vegetables were added to the diet in the fifth and sixth months. The daily use of cod liver oil (two teaspoons) and orange juice (one tablespoonful) was suggested at the first visit for both breast and bottle-fed infants.

North End Clinic. Group A: Sixty-two infants were observed. The average length of breast feeding was eight months and two weeks. The average gain for the first six months was 8.1 pounds, and for the second six months, 4.3 pounds.

Group B: Fourteen infants were in this group. The average gain the first six months was 7.2 pounds; the average gain for the second six months was 5.3 pounds.

Group C: Twelve infants were in this group. The average length of breast feeding was four weeks. The average gain the first six months was 6.5 pounds; the average gain the second six months was 7.2 pounds.

Roslindale Clinic. Group A: Fifty-eight infants were breast fed for an average of six months and one week. The average gain the first six months was 8.5 pounds, and the second six months only 5 pounds.

Group B: Sixteen infants, gained in the first six months an average of 9.1 pounds, and in the second six months an average of 6 pounds.

Group C: Forty-eight infants gained in the first six months an average of 8.6 pounds; in the second six months an average of 6.5 pounds.

II. DEVELOPMENT, INFECTION, DEFICIENCY DISEASES

These factors are more or less related, and will be discussed together.

North End Clinic. Group A: Thirty-six infants of the sixty-two in this group, had signs of rachitis, indicated by craniotabes, rosaries, bosses, flaring of the ribs, enlarged epiphyses, etc. Thirty-three of the thirty-six rachitic children had delayed development, evidenced by late dentition and delayed time of walking. Thirty-

CHART I

COMPARING NUTRITION, INFECTION, DEFICIENCY DISEASES, ETC.

	Gain in wt. 1st 6 mos.	Gain in wt. 2nd 6 mos.	Total gain 1st year	Rachitis	Frequent infection	T. & A.	Enlarged T. & A. + Rachitis + Frequent infection
			North End Clinic				
62 cases *Group A* Breast-fed	8.1 lbs.	4.3 lbs.	12.4 lbs.	60%	47%	41%	37%
14 cases *Group B* Breast- and bottle-fed	7.2 lbs.	5.3 lbs.	12.5 lbs.	42%	33%	33%	17%
12 cases *Group C* Bottle-fed	6.5 lbs.	6.3 lbs.	12.8 lbs.	55%	78%	67%	44%
			Roslindale Clinic				
58 cases *Group A*	8.5 lbs.	5 lbs.	13.5 lbs.	36%	25%	21%	14%
16 cases *Group B*	9.1 lbs.	6 lbs.	15.1 lbs.	33%	22%	22%	11%
48 cases *Group C*	8.6 lbs.	6.5 lbs.	15.1 lbs.	40%	16%	12%	12%

one of the group (sixty-two infants) were frequently ill, evidenced by constant respiratory infections, enteritis, etc. Twenty-three of the group were constantly ill and had signs of rachitis, with enlarged tonsils and adenoids. Group A contained the only case of scurvy among all the infants.

Group B: Of the original fourteen infants in this group, complete study was possible of twelve only. Of the twelve, five had signs of rachitis, and of these five rachitic infants, in four development was delayed. Of the twelve in this group, four were constantly ill. Every one of these four had signs of enlarged tonsils and adenoids, and two, also, had signs of rachitis.

Group C: Of the original twelve cases, a complete study of nine was possible. Of these nine infants, five had signs of rachitis. In every one of the five development was delayed. Of the nine in this group, seven infants had frequent infection. These seven frequently ill included all the rachitic children (five), and all the infants with enlarged tonsils and adenoids (six).

Roslindale Clinic. Group A: Of the original fifty-eight cases a complete study of twenty-eight was possible. Of these twenty-eight, ten had signs of rachitis. Of the ten rachitic children, in five there was delay in development. Seven infants had frequent infections. Of these seven, four had signs of rachitis, and six had enlarged tonsils and adenoids, while four had both signs of rachitis and enlarged tonsils and adenoids.

Group B: Of the original sixteen cases, a complete study of nine was possible. Of these nine, three had clinical signs of rachitis. In only one of the rachitic infants was development delayed. Of the nine infants two were frequently ill. These two had enlarged tonsils and adenoids, while one had rachitis also.

Group C: Of the original forty-eight cases, a complete study of twenty-five was possible. Of these twenty-five, ten had signs of rachitis and of these ten, in eight development was delayed. Of the entire group, only four infants had frequent infections, and these four included the three infants who had combined signs of rachitis and enlarged tonsils and adenoids.

CHART II

VITAL STATISTICS (JUNE, 1928 - JUNE, 1929)

	Live births	Clinic attendance	Per cent. attendance	Total deaths under 1 year	Deaths under 2 weeks	Clinic deaths over 2 weeks	Non-clinic deaths over 2 weeks
Roslindale Clinic	876	349	40%	27	14	2	11
North End Clinic	690	356	52%	32	15	8	9

III. VITAL STATISTICS (SEE CHART II)

North End District. During the year (from June 1, 1928 to June 1, 1929), there were six hundred and ninety live births in this district. During this same period, three hundred and fifty-six new infants (equivalent to 52% of the live births) attended the clinic at least twice during the year. A study of clinic infants in this district showed that eighty per cent. were breast-fed for at least three months; twelve per cent. were both breast- and bottle-fed for at least three months; eight per cent. were bottle-fed.

During the year this study was made, there were among the live births in this district thirty-two deaths of infants under one year of age. Fifteen of the thirty-two deaths occurred during the first two weeks of life (prematurity, congenital defects, birth injury, etc.), and were not considered in this paper. (See chart III.) The remaining seventeen deaths included eight clinic and nine non-clinic infants. The deaths were studied in groups based on breast or bottle feeding (Groups A, B, C), and on clinic or non-clinic infants.

North End Clinic Mortalities

Group A: Respiratory infections accounted for the death of all four infants in this group, including a Mongolian idiot who died of bronchopneumonia.

Group B: No mortalities.

Group C: Of the four deaths, two infants died of respiratory infections, and two of malnutrition (cause unknown).

North End Non-clinic Mortalities

Group A: Four infants died of respiratory infections; one died of a gastro-intestinal infection; and the remaining infant died of status lymphaticus.

Group B: One infant died of respiratory disease.

Group C: One infant died of a respiratory disease, while the other died of a gastro-intestinal infection.

Roslindale District

There were eight hundred and seventy-six live births in this district during the year (June 1, 1928 to June 1, 1929). During this same period, three hundred and forty-nine new infants (equivalent to forty per cent. of the live births), were seen one or more times during the year, and were considered clinic infants.

A study of the clinic infants in this district showed that forty-nine per cent. were breast-fed for at least three months; twelve per cent. were both breast- and bottle-fed; thirty-nine per cent. were bottle-fed.

During the year this study was made, there were twenty-seven deaths among the live births in this district. Fourteen of these deaths were in infants under two weeks of age, and were not considered in this study. The remaining thirteen included two clinic infants and eleven non-clinic infants, as follows:

CHART III

INFANT MORTALITY

COMPARING CLINIC AND NON-CLINIC INFANTS

	Roslindale District			*North End District*		
	Group A	Group B	Group C	Group A	Group B	Group C
Clinic infants	2	0	0	4	0	4
Non-clinic infants	5	1	5	6	1	2

Roslindale Clinic Mortalities

Group A: Two infants died of respiratory disease.

Groups B and C: No mortalities.

Roslindale Non-Clinic Mortalities

Group A: Of five deaths, three were due to respiratory causes, one due to malnutrition (type unknown) and one was due to streptococcus septicemia.

Group B: One death was due to pemphigus neonatorum.

Group C: Four died of respiratory causes, while one died of acidosis (non-diabetic).

DISCUSSION OF RESULTS

1. *Nutrition.*

In the "poorer district" clinic, the breast-fed infants gained, during the first six months, more—and during the second six months, less—than the other infants. At the end of a year the total gain was slightly in favor of the bottle-fed infants.

In the "better district" clinic, there were no great differences between the classes during the first six months. During the second six months, the gain in weight of the breast-fed infants was definitely less than in the other classes.

The infants in the district with better economic and hygienic conditions gained from 1.1 to 2.3 pounds more than the corresponding group in the poorer clinic.

The above is not surprising, for the nutrition of infants is especially affected by frequency of infection; and frequency of infection is more common where there are poor hygienic and economic conditions. Also the breast-fed infant is dependent upon the mother for the quantity and quality of its food. In the poorer district, the nursing mother has much more fatigue, more mental worry, poorer food, and a poorer state of physical health.

2. *Development, Infection, Deficiency Disease.*

Frequency of infection and enlarged tonsils and adenoids are closely related. A rachitic

child has a lowered resistance, so more easily develops infections of the upper respiratory tract. The infection is at first drained by the pharyngeal lymphoid tissue, but this tissue soon becomes infected and remains a source of infection. Living in crowded quarters facilitates more contact and frequent infection. Frequency of infection was often found when the infant had rachitis, associated with enlarged tonsils, and adenoids. In this series of fifty-six infants who had frequency of infection, thirty-eight had both rachitis and enlarged tonsils.

Infection was twice as frequent in all classes of infants in the "poorer district" clinic than in the "better district" clinic.

The bottle-fed infant had the highest frequency of infection in the poorer district, but had the lowest frequency of infection in the better district. This can be explained by the factors of poor hygiene, ignorance, superstition, and lack of sterility in formula preparation in the poorer district.

Surprisingly, two of every five infants in both clinics had clinical evidence of rachitis. With this condition so easily prevented, it is interesting to note the reason. The most important cause was the failure to start cod-liver oil early enough. Following postnatal instructions, the infant (regardless of breast or bottle feeding) gained well and, having no complaints, was apparently doing well, so no medical attention was deemed necessary. Weeks later, when seen at the clinic, evidence of rachitis was present. Other causes were failure to give cod-liver oil constantly; an insufficient dosage of cod-liver oil; poor quality of cod-liver oil used (bought at fish stores).

3. *Vital Statistics.*

Not one clinic infant died of gastro-intestinal infection during the year this study was made. This was probably due to two factors—a good milk supply; all milk used in the formulas was boiled.

In the poorer district, the mortality among the bottle-fed infants was seven times the mortality among the breast-fed infants. Two factors should be considered—first, the direct relationship between frequency of infection and infant mortality (infection by use of unclean nipples, poor hygiene, etc.). Secondly, the mothers in the poorer district (North End) pride themselves upon the length of time their infants are breast-fed (some are breast-fed for over two years) and an infant must be doing poorly before artificial feeding is allowed. As a result, the bottle-fed infant in this district started with a disadvantage.

In the better district clinic (considering economic and hygienic conditions), there was not a single death among one hundred and thirty-two bottle-fed infants. There were two deaths among a group of one hundred and seventy-two breast-fed infants. These two deaths are not evidence adverse to breast feeding, but certainly should not be considered unfavorable to bottle feeding.

Comparing the clinic and non-clinic infants; better results were expected among the clinic infants. Free, regular, weekly visits at the clinics, under care of physicians and nurses especially trained, should be reflected in the results. Therefore it was not surprising to find a comparatively low mortality among clinic infants in both the Roslindale and North End districts.

Roslindale Mortality—clinic .6%—non clinic 2%.

North End Mortality—clinic 2.2%—non clinic 3.8%.

SUMMARY

1. Infants in the district with better hygienic and economic conditions (irrespective of breast or bottle feeding), gained more weight, were better developed, had less evidence of rachitis, less frequency of infection and a lower infant mortality.

2. In the two districts studied, bottle-fed infants averaged a lesser gain in weight the first six months, but averaged a greater gain in weight the second six months. For the entire year, there was a greater total gain for the bottle-fed infant.

3. There was clinical evidence of rachitis in one of every two infants examined in the poorer district of the city, and only in one of every three examined in the better district of the city.

4. Rachitis, presence of enlarged adenoids and tonsils, frequency of infection, and delayed development are related and commonly associated.

5. Frequency of infection and mortalities were most common among the "bottle-fed" group in the "poorer district" clinic; least common among the "bottle-fed" group in the "better district" clinic. Poor economic and hygienic conditions, rather than "breast" or "bottle" feeding is responsible for frequency of infection and instance of mortality in the infant.

6. Not one clinic infant died of a gastro-intestinal infection. Two non-clinic infants (one breast-fed) died of gastro-intestinal infections.

7. Non-clinic infants in each district had a larger mortality than the clinic infants in the respective districts. Non-clinic infant deaths were 2% in the Roslindale district, and 3.8% in the North End District. Clinic infant mortality was .6% in the Roslindale and 2.2% in the North End districts, respectively.

CONCLUSION

This study though dealing with a limited number of infants, would suggest:

I. Infant mortality and frequency of infection have a definite relationship to poor economic and hygienic conditions. In group studies,

"breast" or "bottle" feeding alone are not the determining factors in frequency of infection and infant mortality. The determining factors are hygienic and economic conditions.

II. Infants in a district with poor economic and hygienic conditions have more frequency of infections, deficiency diseases, and a greater infant mortality, irrespective of breast or bottle feeding.

III. In districts where economic and hygienic conditions are fairly good, the average bottle-fed infant does as well as the average breast-fed infant.

IV. Clinic infants have a mortality of one-half that of non-clinic infants in the same district.

REFERENCES

1 McKay, F. L.: Infant mortality in relation to breast feeding. New York State J. Med. 24: 433-488, March 28, 1924.
2 Woodbury, R. M.: The relation between breast and artificial feeding and infant mortality. Am. J. Hyg. 2: 668-682, 1922.
3 Lucas, W. P.: Modern Practice of Pediatrics. Macmillan Co., N. Y., 1927.
4 Pfaundler, M. and Schlossman, A.: Diseases of Children. Lippincott, Phila. & Lond. 1912, vol. 3, p. 71.
5 McClanahan, H. M.: Morbidity of breast and bottle fed infants. Arch. Ped. 35: 653, Nov. 1918.
6 Wilinsky, C. F.: Municipal preventive medicine. Boston M. & S. J. 194: 481, March 18, 1926.

EPIDIDYMOTOMY FOR EPIDIDYMITIS*

Analysis of Ninety Cases and a Review of the Literature

BY CHANNING S. SWAN, M.D.†

ACCORDING to Kretschmer, surgical treatment of acute epididymitis was first performed by Velpeau and consisted of puncture of the tunica vaginalis. Other names connected with the early work in this line include Vidal de Cassis (1853), Pirogoff (1852), and Smith (1864), the latter two being the first to actually incise the epididymis itself. Then came Nunn (1870), Bloxam (1876), Bumstead and Taylor (1883), Cumston (1898), and Escat, mentioned by Belfield (1905). However, to Hagner (1906) goes the credit of standardizing the technique of epididymotomy and thus arousing general interest in the procedure. Since that time many articles have been published on the pathology and surgical treatment of epididymitis. Reference to these may be found in the bibliography at the end of the article.

The ninety cases analyzed in this paper include all those done in the past ten years by Dr. Cunningham and his associates, in which there were found sufficient data to warrant reporting. All were done by the Cunningham modification of the Hagner technique, and with but three exceptions, under gas-oxygen-ether anaesthesia. Some men practice epididymotomy under local anaesthesia as an office procedure. We have had no experience with this method and cannot recommend it. All our cases are hospitalized.

Naturally, all the cases of epididymitis seen in the Clinic in the past ten years have not been operated upon. Approximately one-fourth to one-fifth have received surgical intervention. For the most part the operation has been reserved for the severe cases. The other cases quieted down under a conservative, home régime of scrotal support, ice or heat locally, forced fluids, rest, and cessation of treatment to the urethra or prostate. Any case, however, that showed a progression of symptoms after two or three days of conservative treatment had operation advised. All did not accept it; but it is by comparing the subsequent course of that group with those who did accept epididymotomy that one realizes the great benefit to be derived from surgical intervention in the relief of pain, permanent subsidence of fever, and resultant shorter loss of time economically.

The items of interest which we have considered in the operated cases are: (1) etiology, (2) chief symptoms, (3) side affected, (4) duration before operation, (5) temperature at entry, (6) whether or not suppuration was found, and if so, where, (7) whether the vas was injected with argyrol or not and results thereof, (8) time postoperative to relief of pain, (9) days postoperative to normal temperature, (10) total days postoperative in hospital, (11) when able to return to work, and (12) the question of recurrence.

ETIOLOGY:

Gonorrheal	70
Non specific	14
? Gonorrheal	6

These figures were not determined from smears and cultures of material from the epididymis itself but from previous findings in the given case, i.e., from urethral or prostatic and vesicular smears. However, in a previous paper, Cunningham and Cook reported that in the known gonorrheal cases, smears from the epididymis showed the gonococcus in as high as 80% of the cases.

The cases classified as non specific are those in which no gonococcus was ever found in the urethral or prostatic smears and there was no history of a previous gonorrhea. They also include one postprostatectomy epididymitis. No tuberculous case, however, is considered in the series.

The questionable gonorrheal cases are those where there was a history of an old gonorrhea of two to five years previous. The epididymitis

*From the Urological Clinic of Dr. John H. Cunningham.

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flared up during the cleaning up of the old prostatic infection. However, whether the epididymitis was due to long lingering gonococci or to secondary invading organisms cannot be stated.

CHIEF SYMPTOMS: Local pain and tenderness of varying degrees of severity were present in all cases. In many cases the pain and tenderness extended along the cord (funiculitis). In a few cases the distress went as high as the lower abdominal quadrants. When this is on the right and accompanied with nausea and but little scrotal pain, the picture may simulate an appendicitis. In fact, mild gastro-intestinal upsets are not rare with epididymitis. Fever was often absent and rarely high. The degree of swelling had no constant relation to the pain. Some of those with the slightest swelling had great pain, whereas those with swelling nearly the size of an orange often had but little pain (undoubtedly relief with suppuration). In four cases there was marked oedema of the scrotum. In these cases the usual hydrocele fluid of one drachm to two ounces was found absent. Instead the various scrotal contents were all plastered together. Scrotal abscess was not present in this series.

SIDE AFFECTED: Left epididymotomy was done in 42 cases: right epididymotomy in 45 cases; and bilateral epididymotomy in 3 cases. Each side seems about equally susceptible. The three bilateral cases were recurrent subacute attacks in which first one side and later the other flared up.

DURATION BEFORE OPERATION: The data on this are incomplete. However, it can be said that the majority of cases were operated on from two to eight days after onset; and the next largest group up to two weeks from onset. Several patients had been troubled a month or more and a few were recurrent cases dating back one or more years. Patients who presented themselves with a severe epididymitis unrelieved by previous treatment, all had epididymotomy advised at once. Those which occurred while the patient was under treatment at the Clinic had expectant treatment tried first, but operation advised if symptoms progressed after 48 hours. Many chose to wait a few days longer before submitting to operation.

TEMPERATURE AT ENTRY TO HOSPITAL: This varied as follows:

97-98.6	in 33	cases
98.8-99	" 21	"
99.2-100	" 18	"
100-101	" 4	"
102	" 3	"
103	" 1	"
104	" 1	"
No entrance temperature recorded	" 9	"
Total	90	"

Thus, in this series, in one-third of the cases there was subnormal or normal temperature; in practically another third only a very slight elevation of temperature; while in the other third there was definite fever. From this it appears that most patients with epididymitis run but slight fever, i.e., from 98.8-100 F.

SUPPURATION: Frank pus was found in 54 of the 90 cases. In a previous series Cunningham found gross pus in 60% of the cases and this series shows the same percentage. McKay also gives the same figure in his series.

Distribution of the areas involved were as follows:

Tail destroyed by abscess cavity	in	5 cases
Multiple small frank pus areas in tail alone	in	21 cases
Multiple small frank pus areas in tail and body	in	8 cases
Multiple small frank pus areas in tail and head	in	3 cases
Multiple small frank pus areas in head, body, tail	in	3 cases
Multiple small frank pus areas in head and body	in	1 case
Multiple small frank pus areas in body alone	in	8 cases
Multiple small frank pus areas in head alone	in	5 cases
Total		54 cases

Predominance of involvement of the tail (globus minor) is the constant finding of all authors, and substantiates the view that inflammation of the epididymis takes place by direct extension through the vas. Involvement of the body and head, according to Rolnick, takes place through a peri-tubular and interstitial extension. The microscopic pathology, which is not considered here, has been thoroughly discussed by Cunningham and Cook, Kretschmer and Alexander, Rolnick, Campbell, and others.

In the cases in which no frank pus was found, the epididymis appeared as a swollen, injected organ like a red-hot acute appendix. From the multiple puncture holes flaky or bloody serous fluid exuded which undoubtedly would show microscopic pus in all cases.

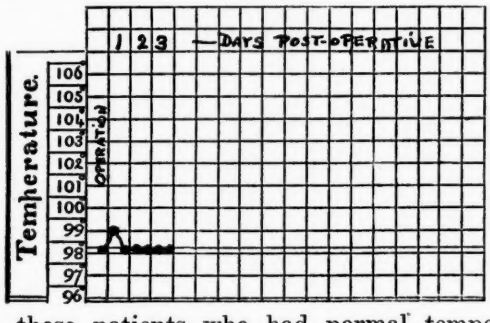
INJECTION OF VAS AND RESULTS THEREOF: In conjunction with the epididymotomy, the Belfield operation of injecting the seminal vesicle through the vas with 10 c.c. of 20% argyrol was carried out in 34 cases. Those with a palpably swollen vesicle or with a particularly dirty urine were chosen for this procedure. In 13 cases injection was attempted, but the vas was found occluded though not greatly swollen. In 7 cases the vas was the size of a lead pencil and obviously occluded. The other 36 cases were not chosen for injection.

In a previous series of 12 patients on whom the Belfield operation had been used at the time of epididymotomy, Cunningham stated he did not "feel that these patients have done better than those in which this procedure has not been employed". Because of this, the procedure was not carried out in all cases in this series. However, of the 34 cases injected, about one in four

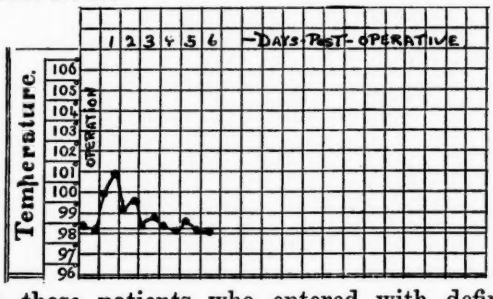
or five, when local treatment was resumed, showed marked improvement in the character of the massage secretion and in the clarity of the urine. For this reason, the procedure is still used in the particularly dirty cases.

TIME POSTOPERATIVE TO RELIEF OF PAIN: As pain is the one great symptom that bothers the patient, naturally that procedure which relieves it most promptly and permanently is to be greatly desired. Nothing is as efficient in accomplishing this end as epididymotomy. Almost every patient stated that, although tenderness was still present to some degree, the pain was gone the morning after operation and did not return. This agrees with Stone, who, writing on the "Comparison of the Results of Various Treatments for Acute Gonorrheal Epididymitis", states: "The most effective means of relieving the intense pain of acute epididymitis is found to be multiple incisure of the heavy tunic of the epididymis. Forty-seven per cent. experienced no pain after recovery from the anaesthetic; by the sixth hour after operation a further 11.7% were free of pain; by the end of the first day a total of 84.3% were relieved, and by the end of the fourth day all were without discomfort." Stone's paper compares the results of epididymotomy with those of expectant treatment, diathermy, mercurochrome, sodium iodide, calcium chloride, aolan, and gonolin in a series of 215 consecutive cases.

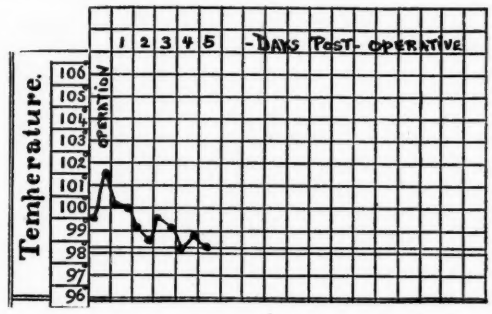
DAYS POSTOPERATIVE TO NORMAL TEMPERATURE: The temperature curves following operation can be divided into three groups: (1) those patients which entered with a normal temperature and maintained it throughout hospitalization, as in the case of Mr. C. R.

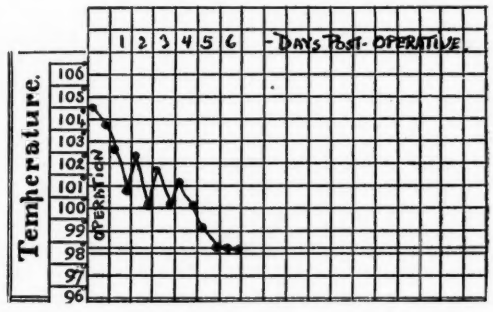


(2) those patients who had normal temperatures at entry but flared up after operation for 24 hours and then tapered off, as in the case of Mr. D. D.



(3) those patients who entered with definite fever and had a rapid subsidence of temperature following operation, as in the cases of Mr. G. and Mr. H. M.





Temperature charts were available in 81 cases and show the number of days postoperative to permanent normal temperature to be as follows:

1	day	13	cases, or approximately		17%
2	days	21	"	"	25%
3	"	21	"	"	25%
4	"	13	"	"	17%
5	"	5	"	"	6%
6	"	3	"	"	3.5%
45	"	1	"	"	1.5%
		4	"	"	5% Temperature 99 at discharge

The majority of patients had a normal temperature on the third postoperative day and by the fourth day 84% were normal. The forty-five day case was one in which a postoperative hemorrhage with subsequent secondary infection kept the temperature elevated. Four cases were allowed to leave the hospital with a temperature of 99.0 F. because their general and local condition was otherwise excellent and they were very anxious to leave. In all no further rise of fever occurred.

TOTAL DAYS POSTOPERATIVE IN HOSPITAL: Figures on this phase of the subject were available in 85 cases. As all the patients in this series were operated on the day they went to the hospital, these figures represent the total hospitalization as well as the postoperative days.

3	days	6	cases, or approximately		7%
4	"	28	"	"	33%
5	"	21	"	"	25%
6	"	13	"	"	15%
7	"	7	"	"	8.2%
8	"	5	"	"	6%
9	"	3	"	"	3.4%
10	"	1	"	"	1.2%
53	"	1	"	"	1.2%

Most of the patients are gotten out of bed on the third day and there are but few who remain in

bed over four days; the summary of the temperature charts given above show that 84% have normal temperature by that time. Patients usually remain in the hospital a day or two after they first sit up, but a small percentage leave on the first day up. The figures above show that 40% are discharged by the fourth day, 65% by the fifth day and 80% by the sixth day. In Stone's series containing 51 epididymotomies only 43% were discharged by the sixth day. Even so, his comparative figures show that operation shortened the time of incapacity by half as compared with expectant treatment.

WHEN ABLE TO RETURN TO WORK: This represents the end of the time incapacitated better than the day of discharge from the hospital because all are not able to return to work the day they leave the hospital. A good deal depends on how knocked out the patient's general condition is on account of his infection, and also on what kind of work he has to do. Unfortunately, we have no accurate data on this subject but it is our impression that the majority of patients get back to work within one to three days after leaving the hospital. A professional hockey player, who came in with an epididymitis of three days' duration, in which the epididymis was swollen five times normal size, was able to play hockey two days after his four-day stay in the hospital. From epididymotomy to return to work averages from five to eight days, we believe, for the vast majority of the patients. It would probably be safe to say that most were back to work by the sixth day. This compares with five to fourteen days for severe cases receiving the expectant treatment, according to Corbus and O'Conor, and with six to fourteen days, according to Stone, for most of his patients. Epididymotomy, then, not only relieves pain most promptly, but may save the patient from six to eight days economically. To many this is an important factor, even after discounting hospital and surgeon's bills.

RECURRENCE: Epididymotomy has the lowest incidence of recurrence of all methods of treating epididymitis. For this reason, it is an ideal form of treatment in all chronic and subacute recurrent cases unsuccessfully treated by other means. Stone mentions 4 recurrent cases out of 51 operations, or 7.8%; Baker mentions 2 cases out of 24, or 8.3%; and our series had 3 recurrences out of 90 cases, or 3.3%. Two of these had a second epididymotomy done, while the third quieted down in two days on conservative treatment. The chief symptom in the operated cases was pain, there being no fever, and very little swelling. The previous operation had been several years before, with complete relief until a recent flare-up of the old prostatic infection, which the patient had not had checked up for a long time. At the second operation all the natural cleavage planes were lost, the tissues being all matted together, and great care had to be taken not to open the tunica albuginea. The epididymes were pale rather than red, and when punctured, gave forth a little watery material but no frank pus. Prompt postoperative recovery took place in both cases with complete symptomatic relief.

CONCLUSIONS: Probably all cases of epididymitis would eventually get well under expectant treatment, as outlined early in the paper, though some undoubtedly would develop an abscess of the testicle with resultant dissolution of that organ. Campbell believes this possibility is great in the non specific group and urges early and thorough operation. In one-third of his 79 operated cases out of a series of 326 cases of non-gonorrheal, non-tuberculous epididymitis the testicle was eventually lost by suppuration. He says, "Clinical observation shows this is not due to surgical error but rather to the extreme virulence and the pyogenic character of the invading organisms. Without operation in those cases in which surgery is indicated, a still larger number of testicles are sacrificed by suppuration." In our series of 90 cases, most of which were gonorrheal, however, there was one long neglected case of gonorrheal origin in which the suppurative process continued after epididymotomy with resultant sloughing out of the testicle.

In order to lessen or stop pain, to reduce fever, and to shorten incapacity, various methods have been devised such as the Martin rubber bandage to produce hyperaemia, diathermy, intravenous medications, intramuscular foreign proteins, vaccines, and operation. From a review of the literature we gather that in small series of consecutive cases and in selected cases, brilliant results, rarely obtainable with the expectant treatment alone, are sometimes obtained by the use of the various non-operative procedures mentioned above. We will admit that our experience in using these adjuncts to expectant treatment is limited, but from what experience we have had, the results have not been constantly good. Three-quarters or more of our patients get along all right with expectant treatment.

However, if the epididymitis is severe enough to keep a patient from work and in bed, with a progression of symptoms after two or three days, we advise epididymotomy. This is because we believe that to date, in large series of cases, epididymotomy is still the method of choice for (1) almost immediate and permanent relief of pain, (2) quick subsidence of febrile reaction, (3) resultant shorter loss of time economically, (4) eradication of what may be the focus, keeping up infection in the other genital structures, (5) lowest incidence of recurrence, and (6) according to Hagner and Cunningham, sterility is less often a permanent defect if operation is done early.

REVIEW OF LITERATURE ON EPIDIDYMITIS

1 Velpeau: Dictionary of Medicine (mentioned by Kretschmer and Alexander).
2 Pirogoff, 1852 (quoted by Smith).
3 Vidal de Cassis: Treatise on Venereal Disease, Paris, 1853.
4 Smith, H.: On the treatment of acute orchitis by puncturing the testicle. Lancet 2:149, 1864.

5 Watson, W. S.: Cases of acute orchitis treated by puncture of the tunica albuginea testis. Med. Times & Gaz. 1:390, 1867.
6 Smith, H.: On the treatment of acute orchitis by puncture of the testicle. Lancet 1:43, 1876.
7 Bloxam, A.: Cases illustrating the treatment of acute orchitis by puncture. Lancet 1:495, 1876.
8 Nunn, T. W.: Acute orchitis treated by puncture. Lancet 1:158, 1870.
9 Bumstead and Taylor: The Pathology and Treatment of Venereal Diseases, Phila., H. C. Lea's Son & Co., 1883, p. 167.
10 Cumston, C. G.: Instrumental orchitis. Internat. Clinics Phila. 2:251, 1898.
11 Escat, Jean: Incision of epididymis for epididymitis. Ann. d. mal. d. org. genito-urin. 21, pt. 2:1664, 1903.
12 Baermann, G.: Ueber die Pathogenese der gonorrhoischen Epididymitis. Deutsch. med. Wochnschr. 1903, 29 (pt. 2) 720.
13 Audry, Ch. and Dalous, E.: Pathology of epididymitis. Ann. de Dermat. et Syph. 4th series, 4:196, 1903.
14 Nobl, G.: Pathology of epididymitis. Arch. f. Dermat. u. Syph. 67:239, 1903.
15 Sellei: Pathology of epididymitis. Dermat. Ztschr. 11:237-244, 1904.
16 Belfield, W. T.: Pus tubes in the male, and their surgical treatment. Jour. Amer. Med. Assoc. 44:1277, Apr. 22, 1905.
17 Bazet: Traitement de l'épididymite blennorrhagique par l'épididymotomie. Ann. d. mal. d. org. genit, et urin. 24 (pt. 1):592, 1906.
18 Hagner, F. R.: The operative treatment of acute gonorrhoeal epididymitis. Med. Rec. 70:565, 1906.
19 Delbert and Chevassu: Pathology of epididymitis. Ann. d. mal. d. org. genito-urin. 26:1201, 1908.
20 Belfield, W. T.: Pus tubes in the male; surgical and vaccine treatment. J. A. M. A. 53:2141, Dec. 25, 1909.
21 Picker: Der Symptomkomplex der rezidivierenden nebenhodenentzündung. Ztschr. f. Urol., Berl. u. Leipz., 1909, III, 1. Beihft., 181-188.
22 Cunningham, J. H.: The operative treatment of acute gonorrhoeal epididymitis. Trans. Am. Assn. G. U. Surg. 8:154-162, 1913. S. G. & O. 17:749-752, 1913.
23 Clark, J. B.: The surgical treatment of acute gonorrheal epididymitis by epididymotomy. Ann. Surg. 59:739, 1914.
24 Merritt, E. P.: Epididymotomy: A new operation. J. A. M. A. 65:949, 1915.
25 Williamson, T. V.: Drainage for relief of acute Neisserian epididymitis. Charlotte, N. C. Med. Jour. 76:60, 1917.
26 Bland, M. E.: The surgical treatment of gonorrheal epididymitis. Jour. Urol. 2:321, 1918.
27 Cook, R. L.: Surgical treatment of epididymitis. J. A. M. A., 70:981, 1918.
28 Vivian, C. S.: The treatment of gonorrheal epididymitis complicated by periepididymitis. Annals of Surg. 67:103, 1918.
29 James, A. B.: Some observations on the surgical treatment of gonorrheal epididymitis, with technique of operation. J. A. M. A. 72:1514, May 24, 1919.
30 Hubbard, T. B.: Epididymotomy treatment of acute gonorrheal epididymitis. South. Med. Jour. 12:619, 1919.
31 Vivian, C. S.: Operative treatment of gonorrhoeal epididymitis. Ann. Surg. 73:357, March, 1921.
32 Allen, C. D.: Report of epididymotomy on 32 cases of gonorrhoeal epididymitis. Mil. Surgeon 49:439, Oct., 1921.
33 McKay, H. W.: Surgical treatment of gonorrheaal epididymitis. J. Urology 5:255, March, 1921.
34 Ravich, A.: Sodium iodide intravenously for gonorrhoeal epididymitis. New York M. J. 115:516, May 3, 1922.
35 Cunningham, J. H. and Cook, Ward H.: The operative treatment and pathology of acute epididymitis. J. Urol. 7:139, Feb., 1922.
36 Wolff, J.: Beitrag zur pathologischen Histologie der gonorrhoischen Epididymitis. Virch. Arch. 228:227-246, 1920.
37 Radnai, E.: Treatment of gonorrhoeal epididymitis with intravenous injections of calcium chloride. Wien. klin. Wchnschr. 35:902-903, Nov. 16, 1922.
38 Wright, L. T.: Treatment of gonorrhoeal epididymitis with intravenous injections of sodium iodide. New York M. J. 118:292-294, Sept. 5, 1923.
39 Walker, K. M.: Treatment of gonococcal epididymitis and its bearing on sterility. Lancet 1:1020-1021, May 19, 1923.
40 Kretschmer, H. L. and Alexander, J. C.: Surgical pathology of acute and chronic epididymitis. J. Urology 10:335-352, Nov., 1923.
41 Stevens, A. R.: Differentiation between tuberculous and nontuberculous inflammation of the epididymis. J. Urol. 10:85, 1923.
42 Walker, K. M.: Etiology, diagnosis and treatment of epididymitis. Lancet 1:1157, June 7, 1924.
43 Corbus, B. C. and O'Conor, V. J.: Diathermy: a specific for gonorrheal epididymitis. J. Urology 2:139-145, Aug., 1924.
44 Cerf, A. E.: Intravenous injections of calcium chloride in the treatment of gonorrhoeal epididymitis. Ther. Gaz. 40:107, March, 1924.
45 Dorsey, T. M.: Epididymotomy for acute epididymitis as an office procedure. Am. J. Surg. 38:81-84, April, 1924.
46 Chenery, A. J.: Intravenous treatment of gonorrhoeal epididymitis. U. S. Nav. M. Bull. 21:547-548, Oct., 1924.
47 Barney, J. D.: Tumors of testis, simulating epididymitis. J. A. M. A. 84:245-247, Jan. 24, 1925.
48 Smith, J. R.: Nonspecific protein therapy. U. S. Naval Med. Bull. 22:334, 1925.
49 Hirsch, H.: Differential diagnosis of torsion of testis retained in inguinal canal. Zentralbl. f. Chir. 52:369-571, March 14, 1925.
50 Potter, J. E. and Redevill, F. H.: Mercurochrome; 220 soluble in genito-urinary diseases. J. A. M. A. 84:1891-1897, Jan., 1925.
51 Rolnick, H. C.: Mechanism of epididymitis. S. G. & O. 41:15-20, July, 1925.
52 Butler, W. W. S. Jr.: Treatment of epididymitis by diathermy. Virginia M. Monthly 52:229-230, July, 1925.
53 Burr, G. C.: Treatment of acute epididymitis. J. Mich. M. Soc. 24:247-249, May, 1925.
54 Herman, L.: Suppurative epididymitis following prostatic abscess. S. Clin. N. Amer. 5:1656-1657, Dec., 1925.
55 Rodriguez, P. A.: Sodium iodide injection in the treatment of gonorrhoeal epididymitis. J. Philippine Islands M. A. 6:223, July, 1926.
56 Ingram, P. C. P.: Suppurating gonorrheal epididymitis; reports of three cases. Brit. M. J. 1:653, April 10, 1926.
57 Leff, C. O. and Spencer, O. M.: Calcium chloride, intravenous for g. c. epididymitis and rheumatism. Jour. Urol. 16:307, Oct. 1926.
58 Burmeister, E. A. and Cahn, P.: Frequency of nongonorrhoeal epididymitis. München. med. Wchnschr. 73:1481-1482, Sept. 3, 1926.
59 Potter, J. E. and Redewill, F. H.: Mercurochrome-220 soluble; foreign protein and sugar in the treatment of 200 cases of gonorrheal urethritis and complications with animal experimentation. U. S. Naval Med. Bull. 26:279, 1926.
60 Stone, E.: Comparison of the results of various treatments for acute gonorrhoeal epididymitis. Rhode Island Med. Jour. 10:25, Feb., 1927.
61 Campbell, M. F.: Gonococcus epididymitis; observations in 3000 cases from urological service of Bellevue Hospital. Ann. Surg. 86:577-590, Oct., 1927.
62 Campbell, M. F.: Treatment of acute epididymitis. J. A. M. A. 1927, 89:2108-13.
63 Jelifier, A.: Lavage of seminal vesicles for epididymitis. Clinique Paris 22:347, July (B), 1927.
64 Wade, H. K.: Treatment of acute gonorrhoeal epididymitis. J. Urol. 18:427, Oct., 1927.
65 Biebl, M.: Chronic non-specific epididymitis simulating tuberculosis. Zentralbl. f. Chirur. 54:2337, Sept. 10, 1927.
66 Rupel, E.: Calcium chlorid in adjuvant treatment of epididymitis. Am. J. M. Sc. 176:399, Sept., 1928.
67 Campbell, M. F.: Nongonorrhoeal, nontuberculous epididymitis. Am. J. M. Sc. 176:386-389, Sept., 1928.
68 Baker, T.: The value of vas injection in chronic genital infections. Jour. Urol. 20:237, Aug., 1928.
69 Campbell, M. F.: Surgical pathology of epididymitis. Ann. Surg. 88:98-111, July, 1928.
70 Rolnick, H. C.: Pathology of epididymitis. S. G. & O. 47:806-811, Dec., 1928.
71 Wildbolz, H.: Nonspecific chronic epididymitis and tuberculous epididymitis. Proc. Staff Meet. Mayo Clin. 3:169-71, June 6, 1928.
72 Jeck, H. S.: Surgical complications of gonorrhoea in the male. Am. J. Surg. 4:291-294, March, 1928.
73 Turner, B. W.: Epididymitis from surgical viewpoint. M. Rec. & Ann. 22:67-69, Apr., 1928.
74 Crance, A. M.: New epididymitis clamp for diathermy. J. Urol. 19:647-649, May, 1928.
75 Stone, E.: Comparison of the results of various treatments for acute gonorrhoeal epididymitis. Jour. Urol. 20:245, Aug., 1928.
76 Lindgren, E.: Chronic septic nontuberculous epididymitis; 46 cases. Ztschr. f. urol. Chir. 25:127-147, 1928.
77 Vintici, V.: Les epididymites colibacillaires. J. d'urol. 26: 409-421, Nov., 1928.
78 Vedfy, G.: Pathogenesis and therapy of gonorrheal epididymitis. Orvosi hetil. 72:1176-1180, Oct. 14, 1928.
79 Wilkie, J.: Note on treatment of gonococcal epididymitis. Glasgow M. J. 112:97-98, Aug., 1929.
80 Grim, D. S.: Observations on acute epididymitis complicating urethritis. Pennsylvania M. J. 32:873-874, Sept., 1929.
81 Campbell, M. F.: Suppurative epididymitis in infancy. Am. J. Dis. Child. 38:794-798, Oct., 1929.
82 Frey, S.: Antiperistalsis in vas deferens as cause of epididymitis. Dermat. Wchnschr. 89:1175, Aug. 10, 1929; 1205, Aug. 17, 1929.
83 Frey: An experimental contribution on the development of acute and chronic inflammation of the testicle and epididymis. 53 Tag. d. deutsch. Ges. f. Chir. 157:111, 1929.
84 Herrold, R. D.: The treatment of acute complications of gonococcus and post gonococcus infections with calcium gluconate. Venereal Disease Information. U. S. Treasury Department Reprint No. 20, Vol. xi, No. 2, Feb. 20, 1930.

TUBERCULOSIS OF THE HIP JOINT*

End Result Study

BY DENIS S. O'CONNOR, M.D.†

THE end result study which forms the basis of this paper was undertaken for the purpose of arriving at a correct estimate of the outcome of the treatment carried out by the orthopaedic staff of the Boston Children's Hospital during the years 1915 to 1924, inclusive. Individual opinion as to the value of any particular method of treatment is often erroneous, based as it is frequently, upon particular cases rather than upon the average result. Realizing this tendency and believing that periodic surveys of results, with, perhaps, comparison of those obtained in other clinics with other methods, and in comparison with the results during a like period in the same clinic, offered the best criteria for judging the value of the therapy employed in this clinic, a study of those cases of tuberculosis of the hip joint treated at this hospital during the ten year period was undertaken.

All the cases classified in the diagnosis card catalogue as tuberculosis of the hip joint were considered. They numbered 189 cases. As must invariably be the situation in looking backward, certain cases were found to be not tuberculous. The number of such cases in this series is rather large, not because of inferior diagnostic ability of the attending orthopaedic surgeons at the Children's Hospital clinic, but for the following reasons, no one of which reflects upon the staff of the hospital:

It is the rule of the Children's Hospital clinic that on the first visit of a patient to the clinic, a tentative diagnosis must be made. While such a rule has obvious disadvantages, it is the common experience of those who are connected with the clinic that unless a diagnosis is made the first time, frequently none is made.

With the tentative diagnosis as a basis, a card catalogue, according to diagnosis, is made up from all cases entering the outpatient department. Since the time when a final diagnosis can be determined cannot well be predicted, a catalogue based upon determined or proved diagnoses cannot be kept. Of the various hip joint diseases coming to the Children's Hospital clinic, tuberculosis of the hip is considered to be the most serious. Where doubt exists, therefore, a tentative diagnosis of tuberculosis of the hip is made. Such a diagnosis automatically places the patient on the preferred list for entrance to the ward for diagnostic study and a carefully worked out routine treatment. Should the case prove not to be tuberculosis, no harm is done and perhaps much good. It is this factor of routine handling of patients which accounts for the large number of cases having a final diagnosis other than tuberculosis of the hip. Another factor in the large number of non-tuberculous conditions in the series is the relative inexperience of the house officers who sometimes make the tentative diagnosis.

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NON-TUBERCULOUS SERIES

Out of a total of fifty-four patients definitely found not to have tuberculosis of the hip, the end result was determined in forty-eight cases. The large percentage of determinations was due to the fact that many of the cases were of short duration and had been closed out with the final result recorded in the history.

Of the forty-eight cases, twenty-two were finally diagnosed as toxic arthritis, a condition simulating tuberculosis of the hip on examination but clearing up promptly on treatment of the cause, which is usually either a pharyngeal infection or a marked constipation. The roentgenograms in all cases were negative. Fifteen of the twenty-two were examined and found to have normal motion in the affected hip. No limp, deformity or other evidence of former hip disease was present. Most of these cases required treatment for only a few weeks and not uncommonly cleared up after efficient drainage of the bowels was attained. The longest period of treatment for a case of this kind was six months. There was a family history of tuberculosis in five cases and exposure to tuberculosis in three. The von Pirquet test was positive in seven cases but was negative in those cases giving a positive family history and history of exposure.

Of especial interest from its bearing on the subject of non-tuberculous arthritis was the end result found in the fifteen cases of toxic arthritis examined. In not one was there any permanent joint damage. This group of cases was also interesting because the joint condition invariably cleared up when the cause, either a faulty bowel function or an upper respiratory tract infection, was adequately treated.

Six of the cases in this series were finally determined to have Legg's disease. The family history for tuberculosis was positive in two cases, negative in two, undetermined in two. The von Pirquet test was positive in four cases, not determined in two. The roentgenogram was the deciding factor in the diagnosis of those cases. A useful degree of motion was obtained in all cases so that the patients felt that they had made perfect recoveries.

Three cases of traumatic coxalgia were negative on x-ray examination and made complete recovery after a few weeks of treatment.

NON-TUBERCULOUS HIP JOINT CONDITIONS

No.	Name	Age at Onset	Hip Affect.	Final Diag.	V. Pir. Test	T. B. Hist.	Exposure	End Result
1.	M. A.	12	Right	Toxic	Neg.	Yes	Yes	Perfect motion.
2.	F. A.	2	Right	Toxic	Neg.	Yes	Yes	3 months' treatment; perfect result.
3.	A. A.	13	Right	Toxic	Neg.	No	No	Normal motion.
4.	E. B.	4½	Right	Legg's	Pos.	Yes	Yes	Roentgenogram; very good motion.
5.	R. B.	6	Left	Epiphysitis	Neg.	Yes	Yes	Roentgenogram; perfect motion.
6.	F. C.	7	Both	Toxic	Pos.	No	No	Perfect motion.
7.	F. C.	4	Left	Legg's	Pos.	Yes	Yes	Roentgenogram; motion good; no deformity.
8.	C. C.	5	Left	Toxic	Neg.	No	No	6 months' treatment; perfect motion.
9.	J. C.	5	Right	Toxic	—	No	No	Ober operation; perfect motion.
10.	J. C.	3½	Right	Traumatic	Pos.	No	No	One month's treatment; perfect motion.
11.	H. F.	2½	Left	Epiphysitis	Pos.	No	No	Roentgenogram; good result.
12.	A. F.	8½	Left	Toxic	—	No	No	One month, perfect result.
13.	D. G.	9	Left	Slipped epiphysis	—	No	No	Perfect result; closed reduction.
14.	S. G.	7	Left	Osteomyelitis	—	No	No	Roentgenogram and operation.
15.	B. J.	5	Right	Legg's	Pos.	No	No	50 degrees flexion deformity; Roentgenogram.
16.	J. L.	8½	Left	Toxic	—	Yes	No	Perfect result.
17.	C. L.	3	Left	Toxic	Neg.	No	No	Perfect motion.
18.	D. M.	2	Right	Toxic	Neg.	Yes	Yes	Good result.
19.	M. M.	3½	Right	Septic	Neg.	No	No	Still under treatment.
20.	C. N.	4½	Left	Psoas abscess	Pos.	Yes	Yes	5th lumbar vertebra destruction.
21.	E. O.	6	Left	Trauma	Neg.	Yes	Yes	Roentgenogram negative; good result.
22.	E. P.	3	Right	Septic arthritis	Neg.	No	No	Post pneumonia.
23.	A. R.	7	Both	Chronic arthritis	—	No	No	Tissue negative for T. B.
24.	R. S.	2½	Left	Toxic	Pos.	No	Yes	Full motion.
25.	E. R.	?	Right	Legg's	Neg.	No	No	Roentgenogram; good result.
26.	M. O.	?	Left	Toxic	—	No	No	Good result.
27.	H. B.	?	Right	Legg's	Neg.	No	No	Roentgenogram; good result.
28.	E. B.	3	Left	Disl.	Neg.	No	No	Case lost.
29.	E. W.	8	Right	Legg's	Pos.	No	No	Roentgenogram; good result.
30.	C. F.	2½	Left	Traumatic	Neg.	No	No	Well in 2 months.
31.	D. M.	5½	Left	Toxic	Neg.	No	No	Well in a few days.
32.	A. N.	3	Left	Toxic	Pos.	No	No	Perfect result; roentgenogram negative.
33.	M. H.	5	—	Iliac abscess	Neg.	No	No	Drainage.
34.	J. M.	4½	Left	Iliac abscess	Neg.	No	No	Cured in 2 months.
35.	G. L.	2	Left	Toxic	Pos.	No	No	Recovered in 2 months.
36.	S. M.	3½	Left	Toxic	Pos.	No	No	Discharged against advice.
37.	K. B.	2½	Right	Iliac abscess	—	No	No	Drainage.
38.	A. H.	2½	Spine	T. B.	Pos.	Yes	No	—
39.	A. E.	6	Right	Septic	Pos.	No	No	Drainage.
40.	R. Q.	2	Right	Toxic	Pos.	No	No	Good result.
41.	D. R.	10	Right	Septic	Neg.	No	No	Drainage.
42.	E. R.	9	Right	Toxic	Pos.	No	No	Recovery.
43.	S. S.	9	Right	Septic	—	No	No	—
44.	F. W.	9	Right	Septic	—	Yes	No	Recovery. Good result.
45.	A. L.	2	Left	Toxic	—	No	No	Good result.
46.	S. M.	4½	Left	Toxic	Pos.	No	No	Good result.
47.	C. M.	9	Right	Epiphysitis	Pos.	No	No	Normal motion.
48.	M. T.	—	—	Osteomyelitis	—	—	—	Died.

Four cases of septic hip were treated by the Ober method of incision and drainage with good functional results.

The final diagnosis in three cases was epiphysitis, iliac abscess in three more cases, tuberculosis of the spine with psoas abscess in two and osteomyelitis in two cases, one of which died.

Chronic non-tuberculous infection, involving both hips, congenital dislocation of the hip, and a slipped capital epiphysis accounts for the rest of the cases.

In comparison with the cases definitely diagnosed as tuberculous, it is of interest to observe that the end results in all the non-tuberculous cases, excepting only the case of chronic arthritis, recovered within a few weeks, or at the most a few months, with a normal or nearly normal range of motion, in contrast to fifty-four out of sixty-seven cases of tuberculosis which had either no motion at all or, at the most, ten degrees of flexion. (Illustration I.)

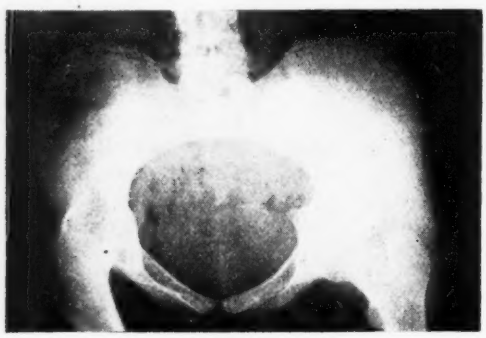

ILLUSTRATION I.

Non-tuberculous infectious hip joint disease with bony ankylosis in extreme adduction. No actual shortening but four inches apparent shortening. Corrected by intertrochanteric osteotomy.

As regards deformity, only one case of the non-tuberculous series showed deformity, while fifty-eight out of sixty-seven in the tuberculous series had measurable flexion deformity.

TUBERCULOUS SERIES

The following exposition of the routine handling of hip joint diseases in the Hospital clinic during these ten years, at this point, will save interpolated explanations at various later points.

Tuberculosis is regarded as the most serious of the hip joint conditions coming to the clinic. Failure to immediately recognize tuberculosis of the hip with the tendency to apply measures short of complete immobilization is considered a loss of valuable time in bringing the diseased process under control and a factor in an ultimate unfavorable result. Therefore, where a definite diagnosis of tuberculosis of the hip could not be made at the first clinic visit but was regarded as a possibility, the case was considered as tuberculosis and so treated. (Illustration II.)

Immediately after a tentative diagnosis of tuberculosis of the hip was made, the case was placed on the preferred list for admission to the ward for diagnostic study and treatment of the acute condition. If the patient could not be admitted to the ward at once, a long plaster spica was applied to remain on until he could be admitted.

On admission to the ward, traction was applied to the affected hip in the line of deformity and maintained until the sensitiveness, muscle spasm and deformity subsided. In the mean-

ILLUSTRATION II.

Tuberculosis of the ilium. Process did not involve hip joint until about two years after discovery of lesion. Diagnosis proved by guinea-pig inoculation.

time, all the laboratory procedures, including roentgenograms of both hips and the lungs, and intradermal tuberculin test, were carried out. Then a Bradford abduction hip splint was applied with traction, the patient gotten up on crutches and sent either to his home (if after investigation by the social service department worker it was found suitable), or to the Convalescent Home of the Children's Hospital, where natural sunlight was used to the best advantage.

The cases at the Convalescent Home were observed once a week by a senior member of the Hospital resident staff and other cases were seen in the clinic at intervals of two to six weeks, depending upon the problems of the particular case. In those cases showing a tendency to persistency of the flexion deformity, a short plaster-of-Paris spica was applied in addition to the Bradford splint.

The final diagnosis of tuberculosis was made after a consideration of the family history, the

KNOWN CASES OF TUBERCULOSIS OF THE HIP EXAMINED

No.	Name	Shortening	Ankylosis Bony	Ankylosis Fibrous	Still under Treatment	Deformity F.	Deformity Ab.	Deformity Ad.	Motion F.	Motion Ab.	Motion Ad.	I. R.	O. R.
1.	F. A.	3 inches		x		25	0	20	5	5	5	0	0
2.	F. A.	1 inch	x			30	0	30		None			
3.	H. B.				x								
4.	C. B.	None		x		45	0	20		None			
5.	G. B.				x								
6.	F. C.	None		x	x	25	0	0	0	0	10	0	0
7.	M. C.	2 inches		x		37	0	25		Slight			
8.	J. C.	None	x			50	0	20		None			
9.	N. D.	"	x			15	10	0		"			
10.	R. D.	1 inch		x		30	10	0	10	10		sl.	sl.
11.	H. D.	2 inches		x		50	10	0	10	sl.	sl.	0	0
12.	D. D.	2 "		x		15	0	0	0	0	0	0	0
13.	A. D.				x								
14.	I. D.	None		x		0	0	0	0	0	0		
15.	R. E.	1½ inches		x	x	15	5	0	sl.	sl.			
16.	L. E.	2 "	x			45	40	0		None			
17.	J. F.	None			x	35	20			"			
18.	T. F.	2 inches	x			45	0	20		"			
19.	R. F.	1 inch	x			85	15	0		"			
20.	T. F.	None		x	x	25	0	0		"			
21.	J. G.	"	x			30	0	0		"			
22.	W. G.				x								
23.	N. H.				x								
24.	G. H.	2 inches	x			30	25	0		None			
25.	N. H.	1 inch	x			25	5			"			
26.	G. H.	1 "		x		45	10	0	5				
27.	T. H.	2 inches			x								
28.	M. H.	None		x		20	20		sl.				
29.	R. H.	"	x			45	0	0		None			
30.	E. J.	1 inch		x		45		10		"			
31.	M. K.	4 inches		x		30	18			None			
32.	J. K.	None			x	Both hips							
33.	A. K.	1 inch		x		45		15	40		5		
34.	F. K.	1 "	x			70	5				None		
35.	R. L.	2 inches	x			45	10				"		
36.	N. M.	3 "	x			45	0	0			"		
37.	M. M.	1 inch		x		30			5	5	5	30	30
38.	M. M.	2 inches				10			75	sl.	sl.	30	30
39.	M. M.	None	x			25				None			
40.	G. M.	1 inch		x		30		5	sl.	sl.	sl.	sl.	sl.
41.	R. M.	1 "			x								
42.	C. M.	None		x		20	10			None			
43.	A. N.	1 inch	x			25	15			"			
44.	N. N.	1 "		x		0			80	20	20	45	0
45.	J. O.	None			x	35			30	15	0	20	
46.	W. O.	"		x		30				None			
47.	C. O.					Both hips							
48.	A. P.	2 inches	x			35		20		None			
49.	H. P.	1 inch		x		0	0	0	90	30	Normal		
50.	O. P.	None		x		35			30				
51.	E. P.	1 inch		x		45	10	0		Slight			
52.	L. R.	1 "	x			30	0	0		None			
53.	A. R.				x								
54.	H. S.	1 inch	x			90	25			None			
55.	M. R.	1 "		x		40		5		"			
56.	A. S.	1 "		x		45		10	sl.	sl.	sl.		
57.	E. S.	1 "			x	Both hips							
58.	A. W.	1 inch			x								
59.	W. W.	None			x								
60.	J. W.	1 inch		x		45		10		Slight			
61.	F. W.				x	Both hips							
62.	J. Z.	1 inch		x		45	30	0	10	10	0	45	30
63.	W. C.			x		0				None			
64.	D. M.			x		0				Slight			
65.	C. L.			x		0				"			
66.	W. C.		x			35	5			None			
67.	F. P.		x			45	0	0		"			

Key: F=Flexion; Ab.=Abduction; Ad.=Adduction; I. R.=Inward Rotation; O. R.=Outward Rotation.

personal history, physical examination, clinical course, laboratory data and roentgenograms. While microscopic examination of tissue obtained at biopsy, or guinea-pig inoculation of joint fluid or tissue, was done in some cases, the routine use of such measures was considered neither necessary nor desirable.

With this brief outline of the diagnostic and

therapeutic routine used, before us, we are in a position to evaluate the results shown in the study of our cases.

The total number of possible cases of tuberculosis of the hip joint obtained from the card catalogue was one hundred and eighty-nine. Fifty-four of these cases were definitely determined to be not tuberculous, leaving a hundred and thirty-five cases of tuberculosis to be studied. Twenty-one, or over 15%, were found to have died. The causes of death were:

General tuberculosis	4
Tuberculous meningitis	9
Tuberculous enteritis	1
Pulmonary tuberculosis	1
Broncho-pneumonia—type not given	1
Cardiac decompensation	1
Acidosis	1
Surgical hemorrhage and shock	1
Amyloid degeneration of liver and kidneys	1
Undetermined	1
Total	21

Of the remaining one hundred and fourteen cases, forty-seven could not be examined because of the distance at which they lived from the clinic. An attempt was made to determine the results in some of the forty-seven cases by sending a blank to the family physician to fill out, but, because of the apparent lack of ability of the average physician to conduct a joint examination, the results could not be used in this study.

Of the sixty-seven patients living, and examined in the course of the study, eighteen were still under treatment and therefore classified as active tuberculosis. Although classified as active, some of these cases could be judged as to the end result.

Both hips were affected in four cases.

Twenty had bony ankylosis. Thirty-one had fibrous ankylosis. Forty-six, including those having bony ankylosis, had slight or no motion; eight had less than ten degrees of motion in flexion; one had 30 degrees, one had 40 degrees, one had 75 degrees, one 80 degrees and one 90 degrees of motion in flexion. (Illustration III.)

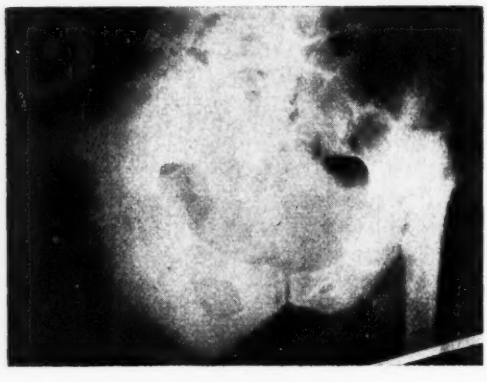

ILLUSTRATION III.

Tuberculosis of hip joint. Complete destruction of head and neck of femur. Destruction of upper margin of acetabulum and upward dislocation of femur with resultant shortening of extremity. Only slight adduction present.

Shortening

4″ shortening	1	—50 out of 67 or about 75%, had one inch of shortening or less.
3″ "	2	
2″ "	11	
1″ "	23	
Less than one inch	27	

Flexion deformity was found in fifty-eight cases, or 86%.

Flexion Deformity

From	To	Number	Per cent.	
0	20	13	22.4	
21	30	17	30.0	52.4% had less than 30% flexion deformity.
31	50	24	41.4	
51	75	2	3.1	93.8% had less than 50% flexion deformity.
75 or more		2	3.1	
Total		58		

Abduction Deformity
(Found in 31%)

From	To	Number	Per cent.	
0	10	11	52	
11	20	5	24	76% had permanent abduction of 20% or less.
21	30	3	14	
31 or more		2	10	
Total		21		

Adduction Deformity. (Illustration IV)
(Found in 22%)

From	To	Number	Per cent.
0	10	6	40
11	20	6	40
21	30	3	20
Total		15	

Motion

Slight or no motion	46 or 80%
10 degrees	8 or 13.5%
30 "	1
40 "	1
75 "	1
80 "	1
90 "	1
Total	59

While fifty-eight patients, or 86%, showed some degree of flexion deformity, only fifteen, or 22%, showed adduction deformity and twenty-one, or 31%, showed abduction deformity. Thirty of the patients showing flexion deformity, or 52.4%, had less than thirty degrees, and all but four, or 93.8%, had less than fifty degrees. In view of the marked tendency of diseased hips to flex and adduct, the results here must be looked upon as very good.

While it is not possible to quote statistics in the relation of deformity to awkwardness in gait, the impression gained from the observation of the above cases was that those having the greatest amount of deformity did not necessarily have the most awkward gait. This would

seem to indicate that other factors besides the deformity in the hip influenced the gait. It is my impression that the actual shortening and the degree of flexibility of the lumbar spine were

ILLUSTRATION IV.

Firm fibrous ankylosis of hip joint following tuberculosis. Adduction deformity with close approximation between upper margin of acetabulum and greater trochanter of the femur. Adduction deformity correctible only by osteotomy of upper end of shaft of the femur.

important factors in the determination of gracefulness or awkwardness in gait.

Of 59 patients in which the degree of motion could or could not be determined, 46, or 80%, were found to have no motion, or so little that it could not be determined and recorded. An additional 13.5% had ten degrees of motion or less. In other words, 93.5% had slight or no motion in the hip joint.

In judging the results of treatment of tuberculosis of any joint, it must be remembered that tuberculosis anywhere in the body constitutes a threat to life. The first object to be sought in the treatment of the condition is control of the disease. Under the treatment outlined above control of the disease is quickly attained. Fifteen, or 11%, died from tuberculosis; 60% of that number died from tuberculous meningitis, the most frequent, the most dreaded, and the most hopeless type of tuberculous disease.

Arrest of the disease, which is interpreted to mean relief of symptoms other than the mechanical impairment of the joint function, had been attained in 80% of the cases examined.

While late studies of joint tuberculosis have tended to show that arrest of the disease with a useful range of joint motion is possible, acceptance of that standard would involve the discarding of many principles of treatment on which have been based much successful treatment. The cure of joint tuberculosis with motion must be looked upon at present as a hope rather than an accomplishment. From the present study it has been assumed that permanent arrest of the tuberculosis of the joint was not consistent with a useful range of motion in the joint. The object sought in treatment was ankylosis of the joint by bone formation. Failing in that, a fibrous ankylosis was regarded as fairly satisfactory. Less than 10 degrees of motion in the hip was believed to be consistent with a good result.

SOME OF THE PROBLEMS AND FUNCTIONS OF THE ADAMS NERVINE

"That symptoms of hysteria following accidents are not always due to the hope for larger awards" is the statement of Dr. Edward B. Lane, Resident Physician of Adams Nervine, which is located on Centre street, Jamaica Plain. This statement is in reference to the fallacy that these nervous symptoms are due to pending litigation.

Dr. Lane states further that Adams Nervine receives many nervous people whose trouble follows a shock, sometimes due to accidents such as collision, but patients are not received there when litigation is pending.

"Many cases of interest, especially during these times when there are so many automobile accidents, come constantly to Adams Nervine," said Dr. Lane. However, only women patients are admitted and these patients must be residents of the Commonwealth. The majority of the cases are the victims of fear more or less fixed.

Generally speaking it has been said that women have the "monopoly" on nervous disorders, but these disorders can be relieved and often cured by means of the fine arts. The hospital does not receive insane patients. Only three qualifications are necessary; the applicant must be a resident of Massachusetts, must be suffering from "nerves" and must be sane. If a patient later develops insanity, she is referred to treatment elsewhere.

Several cases were referred to the hospital following the recent stock market crash. The patients were victims of financial disaster. "They were suffering from shock," said Dr. Lane. "Humiliation is one of the most emotionally shocking of human experiences."

Many patients are treated free at this hospital on Centre Street, Jamaica Plain; others pay a small sum. The officers are: President, Mr. Edward W. Grew; Vice-President, Mr. Andrew J. Peters; Treasurer, Mr. John R. Chapin; Secretary, Mr. Bernard C. Weld.

CASE RECORDS
of the
MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN WEEKLY CLINICAL-PATHOLOGIC EXERCISES

EDITED BY RICHARD C. CABOT, M.D.
F. M. PAINTER, A.B., ASSISTANT EDITOR

CASE 16391

SUDDEN AGING IN A MAN OF SEVENTY-SIX

MEDICAL DEPARTMENT

An American of seventy-six, formerly an apothecary, came to the Emergency Ward February 27 apparently moribund. His history except for a few points was obtained from his brother.

The patient was apparently well until six weeks before admission, when his friends noticed that he seemed to be aging rapidly. His appetite failed and since that time he had eaten only a little semisolid food. Three weeks before admission he had a severe sore throat which had improved little in the interval. Two weeks before admission he began to be hoarse and to have some cough and at the same time considerable dyspnea on exertion, some hiccup and mild diarrhea. All these symptoms had persisted. Three days before admission his brother saw him for the first time in six weeks and was shocked at his condition. He thought the patient had lost thirty pounds as well as much strength and had become very weak, was dyspneic, hoarse and troubled with hiccup. The patient had failed markedly in every way even during the past seventy-two hours and especially during the past twenty-four hours.

His father died at fifty of a "stroke". One brother died of heart trouble.

The patient had always had good health. He did not use tobacco, alcohol or drugs.

Clinical examination showed a wretchedly nourished old man sitting propped up in bed breathing hard, air hungry and thirsty. Very dehydrated. Skin inelastic. Pallor of approaching death. The tongue showed a foul coat. Fauces full, dull red, especially on the right. Purulent discharge coated the posterior nasopharynx. Pecan-sized cervical and axillary lymph nodes. Heart not enlarged. No murmurs. Blood pressure 150/100. Dullness at the right base, in the right axilla and in the right back up to midscapula. Crepitant râles at both bases and in both axillae. Spleen enlarged; firm smooth edge. Liver enlarged. Coarse tremor of the limbs. Both ankles edematous. Left pupil irregular. Reflexes normal.

Urine: amount and specific gravity not recorded, a large trace of albumin at the single examination. Sediment: 75 to 20 leukocytes, 50 to 60 red cells per high power field. Granular and hyalin casts. Blood: hemoglobin 55 per cent, reds 3,260,000, no achromia, moderate variation in size and shape, leukocytes 242,000 to 303,000, 2 per cent polynuclears, 97 per cent lymphocytes, about 80 per cent small and 20 per cent large.

Temperature 99.9° to 101.2°. Pulse 71 to 100°. Respirations normal.

The patient died in about twenty-four hours.

DISCUSSION

BY DR. RICHARD C. CABOT

When a man of seventy-six is brought to a hospital apparently moribund and unable to give his history, one lacks the essential data about his previous life without which diagnosis is often difficult or impossible. Under such conditions it is wise to orient ourselves by recalling that most of the deaths in men of this age are due to one of four causes: (1) cerebral hemorrhage, (2) malignant disease, (3) bladder trouble and its complications, (4) terminal infections, especially pneumonia. We shall therefore be on the lookout especially for these four groups of diseases as we read his case history.

Failure of appetite and rapid aging in a man of seventy-six give us no special clues as to diagnosis. It is difficult to be sure whether they have any particular relation to the significant symptoms, dyspnea, cough, hoarseness, and hiccup, with which he enters the hospital.

The family history contains a certain suggestion of cardiovascular taint.

As we come to the physical examination, the one of the four diseases above listed which seems at first most probable is pneumonia, very possibly complicating some other infection of the upper respiratory tract.

In the physical examination we see at once that the condition of the lungs is important, though the signs in the right back are not clearly significant of any single disease. The dullness in that region is not likely to be due to lobar pneumonia in the absence of bronchial breathing and abnormal voice sounds. On the other hand, the patches of crepitant râles present in both axillae and at both bases may well be due to confluent bronchopneumonia.

Although his blood pressure is somewhat elevated it does not appear that there is enough trouble with his cardiovascular system to cause his death.

As to the condition of his kidneys we can make no reasonable conjecture, as the urine examination is too incomplete. The facts given are compatible with the existence of a chronic nephritis with simple passive congestion of the kidneys and with a urinary infection involving the kidney. The number of red cells per high power field is somewhat larger than any of these

lesions will account for, but the record suggests nothing else to which we can attribute it.

When we reach the blood examination, the diagnosis is settled beyond any reasonable doubt. There is only one disease which can give such an enormous count, relative and absolute, of small lymphocytes. That disease is lymphoid leukemia. The enlargement of the liver and spleen and of the cervical and axillary lymph nodes is probably evidence of the same disease, lymphoid leukemia. This disease will not, however, account for the acute symptoms with which this patient died. It is more reasonable to suppose that he had a urinary infection or an upper respiratory infection which finally involved a bronchopneumonia and so was the immediate cause of death. If this was present it doubtless overwhelmed him more easily because of his age and because of the moderate secondary anemia, which is in all probability due to the leukemia; that is, in all probability there has been lymphoid infiltration of the bone marrow and crowding out of the red-cell-forming tissue.

Nothing that has been said so far accounts for his hiccup, and it is quite possible that even at post-mortem nothing will be found to explain it. There seem to be no terminal symptoms such as should suggest a peritonitis, in which hiccup is often a symptom. I am unable therefore to explain the hiccup in this case.

CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Acute lymphatic leukemia.

DR. RICHARD C. CABOT'S DIAGNOSES

Chronic lymphoid leukemia.
Secondary anemia.
Hypertrophy and dilatation of the heart, probably associated with hypertension and arteriosclerosis.
Chronic passive congestion of the lungs.
Bronchopneumonia.
Very possibly arteriosclerotic nephritis or arteriosclerotic degeneration of the kidneys.

ANATOMIC DIAGNOSES

1. *Primary disease.*
   Lymphatic leukemia.
2. *Secondary or terminal lesions.*
   Bronchopneumonia.
   Arteriosclerosis.
   Areas of hemorrhage and softening in brain.
3. *Historical landmarks.*
   Cholelithiasis.

PATHOLOGIC DISCUSSION

BY JOHN I. BRADLEY, M.D.

The mesenteric, retroperitoneal and bronchial glands were slightly enlarged. The liver was slightly enlarged, weighing 2075 grams. The spleen was markedly enlarged and weighed 1100 grams. On section the markings were somewhat obscured in both.

The lungs contained small scattered nodular areas of consolidation at both bases.

The gall bladder contained several large calculi.

The aorta showed moderate atheromatous changes.

The brain showed a small irregular area of softening having the appearance of a vascular lesion in the right lenticular nucleus and a similar smaller lesion in the pons.

Microscopic study showed a characteristic picture. The vessels throughout all the organs contained large numbers of cells of the lymphocyte series, well differentiated and having the appearance of practically mature lymphocytes and containing very few mitotic figures. The heart, liver, spleen and kidney showed in addition a patchy infiltration with similar cells.

The lung showed a patchy pneumonic exudate with lymphocytes predominating in many areas.

Sections of the lesions in the pons showed a small area of degeneration and gliosis with a moderate infiltration of red blood cells at the margins.

NOTE BY DR. CABOT

As leukemia should I think be classed as a neoplasm with circulating metastasis, the death in this case was I think due to the second and fourth of the diseases which usually kill men over seventy.

CASE 16392

PROSTATIC HYPERTROPHY OF UNUSUAL DEGREE

MEDICAL AND UROLOGICAL DEPARTMENTS

PRESENTATION OF CASE

DR. GILES W. THOMAS*: A sixty-seven year old American Negro entered complaining of oozing piles for ten years and hematuria for seven years.

He had had nocturia and frequency for the past ten years, but was rather vague as to how much. Seven years ago he began to have hematuria coming on in attacks every three or four months associated with severe pain in the left flank which radiated down the left lower quadrant and occasionally into the left testicle. At these times he passed large amounts of bloody urine and occasional clots. During the past year he had had three of these attacks, the last one about three months before admission. A year before admission he had considerable increase in frequency and nocturia, the latter being every fifteen minutes. He had had no difficulty in starting the stream and no dribbling. He was not sure whether he completely emptied the blad-

*Resident on the East Medical Service.

der or not. In the Urological Clinic catheterization gave a residual of thirteen ounces. Cystoscopy was impossible because the cystoscope could not be passed.

Physical examination in the hospital showed peripheral arteriosclerosis and marked bilateral arcus senilis. The thyroid had a fair sized adenoma of the left lower lobe. The trachea was displaced somewhat toward the right. The heart was enlarged downward and to the left; the apex was in the sixth space. The sounds were of fair quality, but in the fourth and fifth spaces on the right was a loud diminuendo blowing diastolic murmur immediately following the second sound. The supracardiac dullness was increased, especially in the first interspace, where it was about 8 to 10 by percussion. Blood pressure 130/80. The bladder was at the umbilicus. He had a large prostate, not very hard. He had oozing hemorrhoids with an ulcerated area around them.

Laboratory findings. The urine showed a trace of albumin, sediment loaded with leukocytes, no red cells or casts. Blood: reds 2,500,000, with a hemoglobin of 35. The smear was not remarkable. Stools, guaiac negative. Nonprotein nitrogen the day after admission 49.

Since the prostatic obstruction seemed to be the chief difficulty this man was transferred to the Urological service.

Clinical Discussion

Dr. Fletcher H. Colby: This patient was transferred to the Urological service because of an obstructing prostate. Rectal examination on the medical wards had revealed the presence of a large benign hypertrophy of the gland. While the patient was able to void he was unable to empty his bladder completely. An overdistended bladder could be felt easily which extended to the umbilicus.

Attempts to empty the bladder by means of a catheter were unsuccessful. A semi-rigid instrument appeared to enter the bladder but no urine was obtained. The reason for this became evident upon examining the specimens removed at autopsy.

Because of the inability to relieve the patient's retention by other means, operation was necessary. Under novocain infiltration a suprapubic cystotomy was performed. The bladder was exposed without difficulty. The bladder wall was considerably thickened. Upon entering the bladder a very large tumor was exposed which filled practically the entire cavity of the bladder. The tumor was so extensive that it nearly protruded through the abdominal incision. Examination showed this to be an unusually marked degree of enlargement of the prostate. The patient's condition would not permit more than a minimum of operating. It was, of course, entirely out of the question to remove the prostate at that time. A large tube was put in the bladder for drainage and the patient was sent back to the ward.

Following operation the patient was fairly comfortable for two days. He died suddenly the second evening after operation.

The patient had had intermittent hematuria for seven years. The bleeding evidently came from thin dilated veins covering the prostate. These become easily traumatized and are a frequent source of bleeding, particularly when infection is present. It is not unusual to have a considerable degree of hematuria associated with benign enlargement of the prostate, particularly if the enlargement is intravesical in character with a prominent median lobe.

Dr. Wyman Richardson: What about the abdominal pain?

Dr. Colby: I should think that was possibly due to reflux of urine into one or the other of the kidneys.

Dr. Richardson: I took that for evidence that the bleeding came from higher up.

Clinical Diagnoses

Benign hypertrophy of the prostate.
Arteriosclerosis.
Arteriosclerotic heart disease.

Anatomic Diagnoses

1. *Primary disease.*

   Extreme hypertrophy of the prostate.

2. *Secondary or terminal lesions.*

   Cardiac infarction.
   Occlusion of the descending branch of the left coronary artery.

3. *Historical landmarks.*

   Polyp of the stomach.
   Colloid adenoma of the thyroid.

Pathologic Discussion

Dr. Tracy B. Mallory: The median lobe of this prostate looks like a uterine fibroid. It is approximately the size of a tennis ball. There is considerable hypertrophy, or at least what for the average person would be hypertrophy, of the lateral lobes; but in comparison with the median lobes they seem small. I think it is rather striking that with the long duration of his symptoms and the extreme size of this median lobe the bladder, although of course hypertrophied, is less hypertrophied than we often see with much smaller prostates. There is a moderate amount of trabeculation, but there are no diverticulae at all. It is actually too big a prostate to cause as much obstruction as the smaller ones, which often act as valves. There is dilatation of both pelves. But on the whole the secondary phenomena seem relatively unim-

portant. The sections show an ordinary benign hyperplasia.

The most important of the remaining findings was cardiac infarction. There was a partially organized thrombus at the apex of the left ventricle, where the wall was markedly thin and white. There was complete thrombotic blocking of the descending branch of the left coronary. That is unquestionably an old lesion, a matter of weeks at least.

DR. PAUL D. WHITE: Was there a history of pain or anything indicating coronary thrombosis?

DR. THOMAS: No, there was not.

DR. MALLORY: He had a fair sized polyp in his stomach measuring 5 by 3.5 centimeters. He had an extremely large colloid goiter, the major portion of which was substernal.

DR. WYMAN RICHARDSON: It is very disappointing to have no reason for the aortic diastolic murmur, perfectly typical except that it was perhaps rather lower than usual, in the fourth interspace on the left. I do not see how that murmur can be accounted for by rushing of blood over a thrombus.

DR. MALLORY: I could not find anything definite on either the aortic or the pulmonary valve.

DR. WHITE: Was the history in any way suggestive of coronary disease?

DR. THOMAS: No.

DR. WHITE: Was there a systolic as well as a diastolic murmur? Was the goiter in such a position that it might have caused pressure on the vessels?

DR. MALLORY: The goiter did reach down and practically rested on top of the great vessels and the aortic arch.

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THREE ERAS

THE *New York Times* on August 17 published a notable contribution by Dr. Haven Emerson based on the recent joint report of the American Medical Association and the National Educational Association relative to the improvement in the Nation's health.

Fifty years ago one out of every four infants died without attaining his first birthday. Today only one out of every seventeen dies during the first year. At that time the life expectancy of the infant who survived his first year was forty years; today it is fifty-eight to sixty years. At the end of the Hundred Years' War in Europe the average length of life was not more than eighteen years; after the Battle of Waterloo it had risen to thirty-three; fifty years ago it was forty years; today in New Zealand it is sixty-four years.

How has this come about? Apparently it has been due to three great phases in the public health history of our time; the first, the sanitary era, beginning in Great Britain in 1848 and gradually extending to this country. Our own pioneers were Lemuel Shattuck of Boston and Stephen Smith of New York who called attention to the fact that people were dying in our cities more rapidly than they were replaced by births.

Boards of Health were created and the physical surroundings of human life were first attacked. Housing conditions were improved, sewers were constructed, pure water was introduced and unwholesome milk was forbidden. Between 1870 and 1900 the foundation for housing reform was laid, nuisances were abated, disease-carrying vermin were reduced and the health officer played more the rôle of a policeman than of a scientist or a teacher. Under authority of the law, cleanliness saved lives and quarantine and isolation checked epidemics.

In 1900 began the second era, the educational era, evolved out of our knowledge of the three simple facts about tuberculosis, that it was curable, communicable and preventable. Such men as Biggs, Trudeau, Prudden and Janeway insisted that no mere exercise of sanitary law could eradicate such a disease, and widespread popular instruction was selected as the most promising power at our disposal.

Following the successful campaign against tuberculosis came waves of educational effort directed against mental disease, avoidable cancer, syphilis and gonorrhoea, heart disease, blindness, deafness and puerperal deaths.

The weaknesses of our past campaigns, however, are disclosed unless we take a further forward step and enter wholeheartedly the third era—that of preventive medicine. To be successful this must assume a universal personal participation, including the individual use of medical skill for prevention as, in the past, we have looked to the doctor to relieve us of the suffering of sickness.

Only by the systematic use of the periodic health examination, Dr. Emerson believes, can we bring the right way of living healthily, with accuracy, force, and appropriateness, into the life of each member of the household, factory or general community. The competent general practitioner of medicine is the original health officer, the family and home the first and best health center unit.

WHAT ARE THE PROSPECTS FOR PUBLIC HEALTH LEGISLATION IN 1931?

THE responsibility of the medical profession respecting public health legislation is stirring the minds of those who are aware of defects in our present laws.

The questions as to whether the time is propitious for changes governing the registration of physicians, further authority for boards of health respecting milk supplies and a state wide policy of extending the protective power of vaccination will undoubtedly be given careful attention.

We may be sure that the State Department of Public Health will try to strengthen the defensive and offensive programs wherever there are weak links in the chain.

The registration of physicians is one of the most pertinent questions of the day for as has so often been said, physicians constitute the first line defense in the contest with diseases and the best qualified doctor is the most efficient adjunct to the administration of public health.

Massachusetts has long stood as one of the few states with lamentable disregard of the necessity of requiring well educated physicians to care for the ills of its people.

This does not mean that a large proportion of our people are satisfied with existing conditions but rather that the appeals to the Legislature for better preparation of those interested in health problems have not been convincing to the majority of that body, but on the contrary the argument of the poor boy who might become a savior of mankind if given a chance or the evil machinations of the "Medical Trust" have had an appeal more effective than the recommendations of those qualified to deal with medical education.

We are looking for a Moses to lead us out of the morass of ignorance and prejudice.

One often wonders why people do not wish to enjoy the blessing of health enough to adopt measures which will insure against septic sore throat, tuberculosis, diphtheria, smallpox, and other preventable diseases; but since many do not want compulsory regulation of health matters, those who know exactly what should be done must wait for that kind of experience or education which will bring to bear on legislators an understanding of their opportunity to bring about better conditions.

Even though Bulgaria and Hungary have practically abolished smallpox through compulsory vaccination, a very respectable number of our citizens are willing to gamble on the considerable chance of escaping the disease.

Dr. Petrillo of the State Hygienic Institute of Budapest and Dr. Minoff, a public health official of Bulgaria, on a recent visit to New York wanted to see smallpox cases because in their own region none was available for study. This is testimony which cannot be ignored.

Fortunately there are persons committed to health propaganda who will persist until further progress is brought about.

The attitude of the several committees and officials will be watched with interest this winter.

THIS WEEK'S ISSUE

CONTAINS articles by the following named authors:

DEAVER, JOHN B. Sc.D., M.D. University of Pennsylvania School of Medicine 1878. F.A.C.S. John Rhea Barton Professor of Surgery, University of Pennsylvania School of Medicine (now Emeritus of same). Surgeon-in-Chief, Lankenau Hospital, Philadelphia, Pa. His subject is: "Health, Science and Vivisection." Page 613. Address: 1830 De Lancey Place, Philadelphia, Pennsylvania.

HUNT, ERNEST L. M.D. Harvard 1902. F.A.C.S. Director Division of Surgery, Worcester City Hospital, Worcester, Mass. Pathologist, U. S. Veterans' Hospital No. 89, Rutland Heights, Mass. Consulting Surgeon, Holden District Hospital. Associate Medical Examiner 11th District, Worcester County. His subject is: "Some Efficiency Problems in Applied Surgery." Page 616. Address: 20 Kenilworth Road, Worcester, Mass.

GLAZIER, MANUEL M. M.D. Tufts College Medical School 1926. Instructor in Pediatrics, Tufts College Medical School. Assistant Physician in Pediatrics, Boston Dispensary. Examiner, Well Baby Clinics, City of Boston Health Department. His subject is: "Comparing the Breast-Fed and the Bottle-Fed Infant." Page 626. Address: 311 Commonwealth Avenue, Boston.

SWAN, CHANNING S. A.B., M.D. Harvard 1923. Assistant Urologist, Massachusetts General Hospital. Visiting Surgeon, Long Island Hospital, Boston Harbor, Mass. Formerly associated with Dr. J. H. Cunningham in the practice of Urology. His subject is: "Epididymotomy for Epididymitis. Analysis of Ninety Cases and a Review of the Literature." Page 631. Address: 264 Beacon Street, Boston.

O'CONNOR, DENIS S. M.D. Bowdoin Medical School 1919. Assistant Professor of Orthopaedic Surgery, Yale University School of Medicine. His subject is: "Tuberculosis of the Hip Joint." Page 636. Address: New Haven Hospital, New Haven, Conn.

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THE HISTORY OF ANATOMY AND ITS INFLUENCE UPON THE SCIENCE AND ART OF MEDICINE*

(*Continued from Page 601, Issue of September 18*)

Upon the death of John Hunter the school of anatomy founded by his brother William, in Great Wind Mill Street, passed on in succession to Baillie, Cruickshank, Wilson, Sir Benjamin Brodie, Charles Bell, Shaw and finally to Mayo and Caesar Hawkins. In 1833 it went out of existence entirely. In 1825 there were in London, in addition to the Hospitals, seven private schools of anatomy. On the Continent at this time Holland was active in the encouragement of anatomical study and the names of

*Contributed by Charles F. Painter, M.D., Librarian.

Ruysch, Swammerdam, Albinus, and Boerhaave were prominent in the last half of the 17th century. In Germany, Haller and in Scotland the Monros, who held the chair of anatomy at Edinboro continuously for 126 years, i.e., from 1720 to 1846, were frequent contributors to anatomical and surgical knowledge. Just as in Europe, where students who received their incentive to pursue anatomical studies carried home with them the spark of learning from Bologna, Salernum, Padua or elsewhere, so in the 18th century it became the fashion for ambitious American students of medicine to visit Great Britain's Universities and upon their return carried with them a desire to spread the gospel among their own people. The first public demonstration of anatomy in America was by Dr. Cadwalader in Philadelphia in 1751 and eleven years later Dr. Shippen became a regular lecturer on this subject in the newly established medical department of the University of Pennsylvania. Though the horror which at first had stood in the way of utilizing the dead for the purpose of anatomical investigation had by this time largely subsided, still there was another very apparent obstacle that stood in the way and that was the procurement of material with which to furnish students with dissection privileges. Munro, early in the 18th century states that he only saw a dissection once in two or three years during his student days and of course had no chance to do one himself. At the end of the 18th century in Great Britain no practical anatomy was provided in the schools for the students until the Hunters established their Laboratory in Great Wind Mill Street. Struthers, writing from Aberdeen in 1866, says that "a century ago it was not uncommon to find a practitioner who had never dissected." In the effort to procure bodies for dissection many methods were pursued that brought medical faculties and students into ill repute and "the Resurrectionists" was a term applied to those who undertook the hazardous occupation of supplying the schools with cadavers. Robert Louis Stephenson has most graphically, and probably truly, set forth their methods in the Scottish University Schools in one of his short stories. Nathan Smith acquired in New England so unsavory a reputation in this regard that he was obliged to leave the Dartmouth Medical School and devote his energies to upbuilding the medical department at Yale. Riots occurred in Philadelphia in which the medical students were used rather roughly and Shippen's house in that city was mobbed as was also that of McCarthy in Dublin, Sir Astly Cooper in London and Munro in Edinboro.

The account[1] of the hanging of Burke who, associated with Hare, had murdered a woman by the name of Docherty in Edinboro in order to sell her body to the highest bidder for dissection purposes, created a great sensation at the time. This was in 1829. Burke was sentenced to be hanged at the place of public execution per order of the court "until he be dead and his body thereafter to be delivered to Dr. Alexander Monro, Professor of Anatomy in Edinburgh University, to be by him publicly dissected and anatomized." The next day the public demonstration became so popular an event that there was a riot instigated by those of the populace who were anxious to witness the dissection and the police were called in to quell it, which they were powerless to do, and finally groups of fifty were permitted to pass through the theatre all that day and the next until, it was estimated, the curiosity of some 20,000 had been satisfied. It was shown at the trial that this pair had victimized, in the same manner, 16 other individuals. In London also it was brought out, at a similar trial, that one group of "resurrectionists" had in a single winter disposed of 312 bodies at an average price of 4 guineas. The epitaph on Shakespeare's grave stone is perhaps expressive of the feeling that was abroad at the time of his death and for long before and afterward. It reads, as you may remember:

> "Good friend for Jesus sake forebeare,
> To digg the dust encloased heare;
> Blest be ye man yt spares these stones
> And curst be he yt moves my bones."

The outcome of this dread and the events above recorded culminated finally, in 1832, in the promulgation of the Anatomy Act, legalizing dissection in Great Britain. In other European countries this had been accomplished somewhat earlier.

The activities of the barber surgeons in the 17th century included the conduct of public dissections and also the cultivation of gardens for the growth of medicinal herbs. An account of the relics of the Barber Surgeons in London and their Hall, designed by Inigo Jones in 1634, makes interesting reading as cited by J. P. Ross. There was originally an Anatomy Theatre connected with this Hall and it was here that dissections were undertaken as authorized by Henry the VIII's Charter to the Barber Surgeons. There is a screen of gilded Levant leather on the walls which has an interesting history. In 1740 a malefactor was executed at Tyburn, by hanging, and his body turned over to the barber surgeons. It is thought that the letting of blood at the outset of his vivisection revived him, at any rate he cried out loudly "Don't" and the company of surgeons extricated themselves from an awkward situation by paying his passage on a ship going East, where he became a prosperous Levant merchant and in testimonial of his gratitude sent back as a present to the Barber Surgeons this screen as a proof of the authenticity of the story.

It was not until 1831 in Massachusetts which was the first of the States to deal with the matter, that a law was passed legalizing the procure-

(1) An Anatomical Retrospect, Hattie, W. H., Canadian Med. Asso. J., Feb., '29, p. 191.

ment of dissecting material. Up to that time the only legal way to secure subjects was through decrees that turned over the bodies of convicts for this purpose. Between 1805 and 1820 there are said to have been 1100 executions in England, an average of 77 per year, and there were in London alone at the time about 1000 medical students.

Sir William Ferguson's Lectures on the Progress of Anatomy and Surgery published in 1867 and covering his active life as an operating surgeon, give a picture of the intimate association of anatomical studies with the practice of surgery as it obtained with him and his contemporaries. It was descriptive, regional or surgical anatomy that the men of that time were interested in, the work of the Hunters having given great impetus to investigations of that nature. Ferguson himself was rather impatient over the tendency to pay attention to minute anatomy, made possible by the perfection of the microscope. Few there were of the great surgeons who had not written upon anatomical subjects before they had ventured upon surgery and the preparation and classification of museum specimens were naturally enough the direction in which the scholarly among the operating surgeons made their scientific contributions. In teaching positions the Professorships of Human Anatomy and Surgery were frequently combined and even down to recent times in our own medical schools this tendency has prevailed. Aspirants for surgical honors in the practice of medicine were nearly always desirous of associating themselves with the anatomical departments of medical schools. In 1825 there were on the Continent such men as Dupuytren, Diffenbach, von Graefe, Lisfranc, Larry, Roux and Velpeau, and in America Warren and Mott; in England, Abernethy, Bell, the Monros, Guthrie, Veitch, Hutchinson, et al, all of them surgeons and all of them contributors to the general fund of knowledge of Anatomy.

PART II

From the foregoing rather sketchy review of the historical background of the development of the Science of Anatomy we come now to a study of how the art of surgery fits in (if indeed it does) with the advances which have marked the progress of the investigation of the structure and functions of the human body. The first surgery that mankind required was that connected with the healing of traumatic injuries and it was probably a long time before pathological lesions were recognized as such, or were the subjects of surgical treatment. How long these phases of surgical knowledge were in developing, after man emerged from a savage state, will probably never be very accurately known. From a chart published in a work on medicine by William Black of London in 1782 the names of sixteen writers upon surgical subjects appear between 400 B.C. and 1500 A.D. In the 1500's the number rose to twenty-one; in the 1600's to thirty-one and in the 1700's to fifty-eight. This is probably not a very accurate measure of the work that was being done in surgery and there are doubtless many reasons why there should have been such a decided increase in surgical activity in the 14th century and after, other than the fact that there were perhaps more physicians who were interested in surgery. It may be that it was largely accounted for by the greater opportunities for becoming familiar with human anatomy and therefore the surgeon was emboldened to undertake things which before that time he would have lacked courage to attempt. The centuries before Herophilus, i.e., prior to 1500 B. C., seem to have been a period, when, the world over, men were learning to treat traumatic wounds on about the same principles. When we reach B.C. 1000, bandaging to restrict swelling and measures to control hemorrhage were being practiced in much the same manner as at present wherever there is information available to enlighten us.

It was not until the Trojan War 1194-1184 B.C. that surgery received recognition through the granting of permanent trophies to its eminent practitioners such as were already being granted to those who had distinguished themselves for bravery in battle. Two lines from Homer are often quoted to emphasize the importance to armies in the field of competent medical service, viz.:

"A wise man skilled our wounds to heal
Is more than armies to the public weal."

In 886 B.C. Licurgus gave orders that physicians should accompany all Spartan armies. It was mostly in connection with the treatment of service wounds that these physicians were concerned and the operations they performed were chiefly trephining of the skull for head injuries and sometimes of the long bones to give vent to pus and the treatment of hemorrhage, in which endeavor, when all other methods failed, they ligated the bleeding vessels. Venesection was very generally employed and it was upon this, a fasting diet and cooling drinks that reliance was placed in such treatment of visceral inflammations as they ventured to undertake. Poultices and astringents comprised most of the local surgical treatment that was practiced. Cutting for stone in the bladder had been performed before the time of Hippocrates. Indeed he discouraged his followers from doing so as he regarded it as a bit of quackery, for it was at the hands of irregular and peripatetic practitioners that most of it had been done. It required a great war (Alexander's conquests) where many Greek troops campaigned for a long time in a tropical country, and the establishment of the Alexandrian School, where anatomy was first studied practically, to provide surgery with a fresh impetus. The Romans kept aloof from all things medical or surgical at this period. It was not considered compatible with

the dignity of Roman citizenship to become a physician and for many years the only doctors Rome had were Grecian slaves attached to the great patrician houses. Irregulars and quacks of all kinds there were in abundance. [During the first century the Methodists, an organization that dealt with external injuries, deficiencies of parts and enlargements was formed in Rome. They were adept in the treatment of wounds complicated by external poisons, as from poisoned arrows, spear heads, etc.] In the ruins of Pompeii and Herculaneum some forty surgical instruments were found in a house belonging to a surgeon, consisting of lancets, forceps, catheters, speculae, cupping glasses, etc. These were mostly made of bronze, some of silver. In the Royal Bourbon Museum in Naples there is a still larger collection of 199 surgical instruments from Herculaneum and Pompeii.

In the Talmud, prior to 200 A.D., there are found evidences of the progress of surgery among the Jews. The Rabbis were acquainted with methods of suturing wounds, freshening their edges to ensure union and the employment of a hollow uterine sound to assist in differentiating hemorrhages from the uterus or the vagina. They report cases of imperforate anus and they were familiar with drugs that produced a certain degree of anaesthesia. Prior to the captivity of the Jews in Egypt (1700 B.C.) there is no record of any surgical operations among them. It is stated that Joseph gave orders for the physicians to embalm the body of his father and it is also stated that Abraham was subjected to the operation of circumcision when he was ninety years of age. Abraham's time was about 1900 B.C. The instrument used in the performance of circumcision was made from a sharpened stone. Trephining, which was performed chiefly for headache, epilepsy, etc., probably dates back to the Pyramid builders in Egypt. Between that time and the date of the Ebers Papyri (B.C. 1552) there are only such records of surgical procedures as are represented in hieroglyphics upon tablets or depicted in mural decorations. By that time, 1552 B.C. surface tumors were known and in a measure differentiated. In particular, suggestions were made whereby one might distinguish the fatty tumors from those of another nature. Certain artificial parts were supplied notably in injuries to the trachea. Artificial legs were constructed and defects in the cranial bones were supplied when, as a result of depressed fractures, considerable pieces of bone had to be removed. That artificial teeth were used has been proven in certain of the mummies. Bandaging was done in great perfection and the bandages were stiffened with some reagent comparable to the modern "silicate". The excellent results in the handling of fractures observed among the mummies testify to the accuracy of their reductions and alignments and the general efficiency of their treatment. Surgical instruments of many sorts have been found in Egyptian tombs, e.g., probes, scissors, knives, forceps, cupping vessels, etc. Homer, about 1000 B.C. describes the treatment of forty wounds in different parts of the body. The Court of Cyrus was noted for the skill of the opthalmic surgeons which he gathered about him because his troops had suffered so much in some of their expeditions into regions where the sunlight injured their eyes. Between his time and that of Hippocrates, B.C. 462, there is, in Grecian literature, very little reference to any surgical subject. Four different kidney lesions however were described and it was advised that in certain tumefactions about this organ that incisions should be made to give vent to suppuration. The surgery of Hippocrates' time concerned itself chiefly with head injuries, fractures, dislocations, hemorrhoids, fistulae and ulcers. His directions for the employment of trephining in compound skull fractures were quite specific though not wholly in accord with modern views, whereas the principles he followed in fractures and dislocations of the long bones were not dissimilar to those of the present day. It is evident that he had plenty of trouble with sepsis in the management of compound fractures.

The surgery of India was doubtless largely influenced by Arabic teaching and such records as are extant only cover the period from 1000-700 A.D. They were, for the time, quite clever in devising and constructing instruments. The tools were generally designed for a definite purpose, as for example, scarifying, amputating and puncturing. They had catheters, needles and string for suturing and ligating. Fractures and dislocations were treated quite well then with bamboo splints, just as now. Operative procedures included removal of moles and polypi, tapping for ascites, removal of foreign bodies and lithotomies, performed both by the suprapubic and perineal routes. They also undertook plastic surgery, particularly rhinoplasties. In the acquisition of operative technique they practiced upon animals, and they punctured fruits and gourds in order to acquire familiarity with the resistance met in the insertion of a trocar. Among the Chinese Hwa To is regarded as the pioneer surgeon. He is believed to have lived in the third century A.D. He performed abdominal section for relief of visceral disease and treated caries of the scapula by operative methods. He also is reported to have punctured the ventricles of the brain to relieve pressure. Laparotomy was performed by Chian Kuei in the sixth century. Records of Chinese surgery are sparse and even today there is so little done by the native Chinese that it seems improbable that there was ever much activity in this line among the Celestials.

The Alexandrian school made rapid and very considerable advances in surgical practice perhaps stimulated by the fact that it was here that anatomy got its first real start through the

practice of human dissection. Celsus wrote in the most brilliant period of the Roman Empire (30 B.C. to 14 A.D.) during which time lived Ovid, Virgil and Horace. He describes carefully the operations for cataract, phimosis, bronchocele (goitre), nasal polypi, varicocele, umbilical and intestinal tumors, herniae, amputations through healthy tissue with the use of ligatures, instead of through dead tissue so as to avoid bleeding, which was the method of Hippocrates. He also refers to the plugging of the nares to control nose bleed. He also discusses versions and Caesarean section. Between Celsus' time and that of Galen, 131-200 A.D., there were three surgeons of considerable note, viz.: Soranus of Ephesus, Rufus of Ephesus and Heliodorus. Most of their writings have been lost but enough have been preserved to show that they were treating herniae by excision of the sac and resecting strictures of the urethra. Soranus discusses the differential diagnosis of pregnancy from ascites and solid tumors by means of palpation, percussion and succussion. He was acquainted with the use of the uterine sound and speculum. Celsus reports also that hydrocele of the cord was being treated by the actual cautery. Aetius and Alexander of Tralls were the compilers of the significant medical observations of the 6th century. They give a good deal of prominence to the uses of charms and amulets in the treatment of disease. Rome which was founded 750 years B.C. boasted of having no physicians for 600 years relying wholly upon spells and incantations. Heliodorus who antidates Celsus gives the first account of torsion and ligation of vessels and performed external urethrotomy for stricture.

Paul of Aegina was the last of the Greek writers on medicine. His time was during the seventh century. He studied at Alexandria and among his writings there is one entire book devoted to operative surgery. In the treatment of hemorrhage the Hippocratic writers had been silent, certainly so far as arterial hemorrhage was concerned. Celsus refers to it and advocates the use of lint, cold water compresses and vinegar. The employment of caustics he discouraged for fear of inflammation. Should these methods fail, ligation of the vessel on either side of the point of bleeding was advised. This is the first published reference to the use of the ligature. They did also distinguish between arterial and venous bleeding. It is very strange that, possessed of this knowledge, no one seems to have thought of ligating vessels at amputation until Archigenes, early in the second century, appears to have ligated the large vessels of the leg prior to amputation. Apart from this attempt the red hot iron was the only method employed to check bleeding in a stump after amputation. Galen refers to the treatment of Aneurysm, a subject not mentioned by Hippocrates or Celsus. Antyllus treated it by double ligation. In the matter of skull fractures Celsus follows Hippocrates' teaching very closely and in fact the Greeks and Romans were not very far apart so far as this treatment was concerned; neither in principle did it vary much from that of today. Both Galen and Celsus discussed Cancer, particularly that occurring on the face and in the female breast and were aware of metastases in liver and spleen. They recognized the incurable, and therefore inoperable, varieties. Galen and Celsus both describe in considerable detail the operative treatment for stone in the bladder and Paul of Aegina followed their practice very closely. Albucasis, the most celebrated writer of the Arabian School, who died in 1105, was the first to illustrate his surgery with drawings of the instruments he employed. He discusses the use of the cautery, scarification, blood letting, fractures, sprains and dislocations. He refers to "the cord used in musical instruments" as suitable for ligatures, which may perhaps indicate that he was the first to employ catgut as ligature material. He was unquestionably very familiar with the work of Paul of Aegina who on his part gave the ancients credit for doing practically all the major operations with which he was familiar and he was throughout the entire period of the revival of letters in Western Europe the authority on surgical matters. He evidently had removed scrofulous or tuberculous glands from the neck and believed that the trachea could be opened without too great danger, though it does not appear that he himself had undertaken to do so. He operated upon certain pedunculated abdominal tumors which were of a malignant character but never successfully; neither had he heard of anyone who ever had. From Albucasis' time on, to the period of the establishment of the Universities of Northern Italy, there were very few writers upon surgical subjects and what little surgery was being done was by peripatetic barber-surgeons and their ilk.

Early in the thirteenth century Roger of Parma came into prominence as a surgeon and writer on surgical subjects. He published his book in Venice in 1490. He and Roland, a pupil of his, were also close followers of Paul of Aegina.

Guy de Chauliac is the next outstanding figure in the surgical world. He was born about 1300 and was fortunate in being able to study medicine at the three great Universities of his day, viz.: Paris, Bologna and Montpellier. His contributions were not many on the practical or technical side but he wrote a surgery that was standard for above two hundred years. This was written in 1363 though it was not printed until 1478. Because of the fastidiousness of the medical men of the day, who thought surgery was beneath their dignity, most of the care of wounds and other surgical lesions fell to the lot of the "barber-surgeons" whose original duty was to shave the heads of the monks and with-

draw blood from them on certain prescribed occasions.

The invention and use of gunpowder added a new element of danger in military surgery, for the wounds were generally regarded as poisoned. The first time the English used gunpowder in war was at the battle of Crecy, in 1346. John de Vigo (1460-1520 ?), surgeon to Pope Julius II, wrote the next epoch-making Surgery after that of Guy de Chauliac and in it discusses for the first time in medical literature, the injuries inflicted by firearms. In this book is also a Chapter on Syphilis, a disease only just then manifesting itself in Europe. Another surgeon of some prominence in this period was Tagliacotius, who was Professor of Anatomy and Surgery at Bologna during the latter part of the 16th century. He was a pioneer in plastic surgery and was the first to employ skin flaps from the arm to repair defects on the ear and lip. The method was seized upon by some for show purposes, anticipating P. T. Barnum by a good many centuries. "Double monsters" were exhibited as a result of grafting flaps of the skin of the buttocks of one boy into the buttocks of another, back to back. Victor Hugo recalls this practice in "L' Homme qui rit". The period was characterized by the practice of two classes of itinerant operators known as "cutters" and "incisors". They travelled about operating chiefly upon hernia and stone in the bladder. The Colot family were perhaps the most famous of these, just as the "Sweets" in Eastern Massachusetts have for many years had a reputation for bonesetting. The first recorded case of suprapubic lithotomy belongs to this time. Ambroise Paré lends the chief distinction to Surgery in the 16th century, his greatest contribution being the use of ligatures in amputations. Germany, up to the middle of the 15th century, had produced no conspicuous surgeon except Braunsweig who wrote a very excellent Surgery a copy of which is in Dr. Bullard's collection of Incunabula in this library. The times of which we are writing were by no means free from shysters and charlatans and as is usually the case the really able physicians, who were unscrupulous, were more of a menace than the more simple ones though they sometimes had ideas far in advance of their times. Paracelsus, e.g., who was really a genius, was a quack of the first water. He had studied alchemy and chemistry but practised surgery. He believed that there were juices within the body that tended to heal wounds and scoffed at the idea that suppuration was a necessary step in the progress of wound healing, crudely anticipating later theories regarding immunization and antisepsis.

In the 17th century the world was entering upon an age when the scientific spirit was coming to the front and so much that was new was being discovered that a practical matter like surgery was not receiving much attention. It was the time of Francis Bacon, Galileo, Descartes, Pascal, Isaac Newton and Robert Boyle. It was also the time of Harvey, Sydenham and Fabricius. The latter had a well trained mind though he made no great contribution to the art of surgery. His renown and the number and excellence of his writings contributed to making the University of Padua the most famous place in Europe in which to study medicine, particularly in respect to anatomy and surgery. He refers to surgery of the intestines and calls attention to the desirability of using animal sutures and cites the introduction of the trachea of an animal into the lumen of a severed gut, in order to keep it patent while healing. He reports a tracheotomy and states that he had seen one case of cancer of the breast get well after excision of the breast.

When one starts out with a preconceived notion about anything it not infrequently happens that he finds that such a preconception was really only a notion and had no body of facts to support it. As I review the evidence of such of it as I was able to compile, concerning the development of the science of anatomy on the one hand and the progress of the art of surgery upon the other, as it has grown up since the days when it concerned itself almost solely with the healing of wounds and ulcers, I am forced to the conclusion that those who were possessed of the instinct for surgical therapeutics were but little hindered by a tyro's knowledge of anatomical structure and would have advanced with but little more rapidity had their opportunity for dissection been accorded them much earlier. It is true that after the time of Vesalius and Harvey operative technique took long forward strides but it must be remembered that many other factors may have entered into the equation, nor should we forget that long before there was any opportunity for acquiring an anatomical background the bolder ones among the medical profession were undertaking many operations for which they made their anatomical preparation as they went along. How the wild Aborigines of Australia, the South Sea Islands or the Eskimo learned so successfully to sterilize their women by an extra-abdominal procedure, through the inguinal region, in a manner not dissimilar to that by which a veterinary surgeon spades a bitch, and to trephine the skull, the shafts of the long bones and sometimes even the joints for rheumatism or arthritis, without any knowledge whatsoever of anatomy, it is difficult to understand and yet there is abundant evidence that it was a common practice among them and they did it with instruments made of bone or stone. It was the custom in certain tribes who circumcised the males to perform a similar operation upon the females through excision of a part of the clitoris and the labiae minores. They also made a suburethral incision on the males the purpose of which is not apparent unless it may have represented some of the earlier attempts at birth control. Many a clumsy

technician today, provided he has a pretty good idea of what he conceives to be the goal he has in view, gets very good results without drawing heavily upon any store of anatomical knowledge which he may or may not possess. If he is clean and knows something of morbid anatomy he can manage to get by without having scarcely a speaking acquaintance with many of the structures he must pass through, or by, on his way to the lesion he seeks to treat. There were times when anatomical knowledge seems to have stimulated surgeons to greater activity in applying operative therapy for the relief of bodily lesions. One of these was for a while after Vesalius' great work on anatomy was published and again when the Hunters established in London their schools of anatomy. From this latter period there seems to have been no falling off of interest in surgery and furthermore this would appear to mark the time when surgeons of repute seem, almost invariably to have been men who had come up to the mastery of their profession through the experiences of the dissecting room. They were teachers of anatomy at some time during their careers. This would seem to have been rather more true of the English speaking surgeons than of others. The control of hemorrhage must have served to embolden the operator and allay the terror of the patient for knowledge of the cruder methods must have been a deterrent, for the terrors of boiling oil and red hot iron must have been broadcast as the means of stasis, at least by those who had experienced the suffering. Though there was no real knowledge of the circulation until Harvey's time, still veins and arteries were referred to and the differences between them, or some of them, were well recognized. With even the little knowledge of the circulation thus possessed it is not unthinkable that surgeons should have been willing to adventure a good deal without much fear from bleeding even before the ligature was known. Even though general anaesthesia opened wide the doors both for the surgeons and also for the timid among their patients, we must remember that far back in the early childhood, if not the infancy of the profession some sort of benumbing drugs were employed that served to make less brutal the ministrations of the surgeon. In the Odyssey Helen puts a sleeping potion in Telemachus' wine. The Talmud speaks of a narcotic "Somme de Shinta"; the Arabian Nights of "Bhang," Shakespeare of "drowsy syrups" and a long list of soporifics, e.g., dewtry, henbane, mandrake, hemlock, lettuce, opium, and Indian hemp were used to induce a degree of anaesthesia that took away some of the terrors of operative surgery. When the time arrived in which histology and morbid anatomy opened up new fields to explore, if not always to conquer, surgical technique had been perfected to such a point that superficial anatomical knowledge and experience did not restrain the surgeon from extending the scope of his operative treatment and that without any considerable additions to his anatomical armamentarium. Infection was becoming the surgeon's bugbear and mortality had doubtless increased in frequency as the conditions of living became more and more complicated. When Pasteur gave the clue to the solution of this problem and Sir Joseph Lister perfected the early antiseptic technique then a far more serious obstacle to the progress of surgery was removed than ever existed because of lack of knowledge of anatomical structure or pathological histology.

There is another group of facts that are difficult to explain and seem to indicate that surgery has not necessarily been restricted to any great extent by lack of anatomical knowledge. Among primitive people, whether they were prehistoric or fairly modern, there seems to be an almost instinctive knowledge of how to do certain things that must be done in the way of surgical treatment to meet the accidents befalling those who live a tribal life. Fractures, for example, have been surprisingly well handled among those who lived under such conditions. Smith has collected illustrations of fractures shown in mummies of the date of 2700 B.C., where splints had been applied to hold the fragments in apposition in multiple thigh fractures and the position was good after nearly 4500 years. The Boganda tribe of African negroes insert, to this day, strips of wood next to a bone, bridging over the seat of the fracture, drawing the flesh down over it and lashing the splint, thus subcutaneously placed, by bands outside. Some of the Melanesian tribes in the South Pacific have employed green wood for intermedullary grafts in compound fractures of the tibia, driving one end into the marrow cavity of the upper fragment and then by traction and flexion exposing the lower fragment until it was possible to insert the other end of the stick into the medullary cavity of this fragment. The Polynesians, the Paraguayans and the native tribes of New Guinea, Borneo and India as well as certain of our own Indian tribes, particularly the Shoshones, are employing willow twigs and other wood fiber and the bark from trees in the treatment of fractures. The heavy, large-leaved tropical foliage is frequently resorted to for the purposes of splinting. The Aztecs were treating fractures with splint material when the Spaniard came first to their country. Craniotomy for headaches and as a part of magical treatments of various sorts has been an almost universal practice among primitive peoples and often they have been so far separated from one another in time and space that it seems hard to believe that one learned it from the other. Stone and bone were so fashioned by primitive man that cutting operations were done with instruments of this sort long before copper, bronze or iron were employed for

such purposes and it is thought that copper at any rate was known 8000 years before Christ.

Representations on slate tablets of Ancient Egyptian dynasties show the operation of circumcision being performed and though the Hebrews may have learned to do this from their captors, the Egyptians, yet why it was so widely done among peoples for whom there was no religious compulsion, it is hard to understand unless it has been the survivor of a number of mutilating operations that seem to have had a vogue among all primitive people which may possibly have had some connection with their belief in magic. Such customs are reported from so many localities where life is, even now, of the most primitive tribal sort that it almost seems such procedures have been a part of a universal inheritance, the reason for the existence of which is now so long outgrown that civilized peoples can no longer apply any logical explanation. Certainly there is no anatomical knowledge possessed by these primitive peoples and yet they are doing a certain amount of surgery that we would think should not be done in the absence of some acquaintance with structural anatomy. Garrison calls attention to the fact that in spite of Vesalius and the School of Anatomists he fostered, that the 17th century was far less well supplied with surgeons than had been the three preceding this era, particularly in Italy and France. It would therefore appear that anatomy should be regarded as the handmaiden of surgery and a very helpful one to those possessed of the best qualifications for becoming surgeons, but a service which has never been wholly indispensable and which has contributed less to the success of the surgeon of today than does pathology, physiology or even biochemistry.

MISCELLANY

TUBERCULOSIS ABSTRACTS

Robert Koch in 1884 raised hopes that tuberculin would prove to be a specific cure for tuberculosis. His failure did not discourage but rather spurred on numerous other brilliant workers. A half-century of futile search has considerably dampened the hope that a single genius will solve the riddle. There is, however, promise of a solution in the joint effort of many minds. Such an effort is being made by the Committee on Medical Research of the National Tuberculosis Association, which, since 1921, has been working systematically on anatomical, pathological epidemiological studies, and particularly on an analytic study of the tubercle bacillus itself. When the composition, nature, and physiology of the bacillus, as well as the body cells involved in the disease, are fully understood, it is not only possible but probable that a simple means will be found to cure and prevent tuberculosis. Kendall Emerson has given a résumé of the work and findings of this committee in the *Journal of the American Medical Association*, March 15, 1930, from which the following synopsis is derived:

RESEARCH IN TUBERCULOSIS

Research in the chemistry and biology of the living tubercle bacillus required far more in equipment and personnel than could be found in any single laboratory. There were, however, numerous individuals equipped to carry on highly specialized and technical research. The Committee on Medical Research, organized in 1921, succeeded in interesting a considerable number of specialists in attacking the study under a coöperative plan. Twenty-one different laboratories are now so correlated, and workers of these laboratories meet in frequent conferences under the leadership of the chairman of the committee.

MATERIALS STANDARDIZED

In order to make the results in different localities comparable, it was essential first to standardize all products. Esmond R. Long of the University of Chicago produced a synthetic medium composed of chemically pure ingredients of exactly known quantities and qualities for the growth of the bacteria. As no laboratory was equipped to grow the bacteria in quantities sufficient for the desired analyses, two manufacturers, the H. K. Mulford Company and Parke, Davis & Company, generously undertook to grow and supply such raw materials. Both the

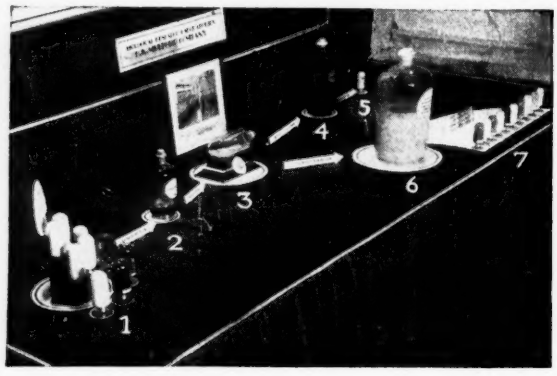

Exhibit illustrating fractioning of tubercle bacillus.
1. Ingredients of Long's media.
2. Long's media.
3. Tubercle bacillus culture on Long's media.
4. Bacterial filtrate.
5. Protein 304-F precipitated from filtrate.
6. Bacteria precipitate (tubercle bacilli).
7. Pure chemical products derived from bacteria.

—Courtesy H. K. Mulford Co.

bacteria and the synthetic media in which they are grown are subjected to research, the latter to determine the chemical changes occurring as the result of the metabolism of the bacteria. Up to the present time, five varieties of bacilli have been produced and subjected to analysis—human tubercle bacillus H-37, the bovine, the avian, non-specific timothy grass, and lepra bacilli. After filtration, the bacteria are shipped to Sterling Chemical Laboratory at Yale University and the filtrate to the Department of Pathology of the University of Chicago.

BACILLUS IS FRACTIONED

Under the direction of Treat B. Johnson of Sterling Laboratory, the bacterial residue is broken up into isolated fractions, or pure substances, some of which were hitherto unknown to chemistry. Similarly, at the University of Chicago, the filtrate, or medium, is subjected to chemical disintegration. These several fractions are then sent to the Rockefeller Institute, where, under the direction of Florence R. Sabin, they are tested out individually on animals for their physiological effects. At the same time, a clinical study is made of the fractions by David R. Lyman of Gaylord Farm Sanatorium.

Thus far, there has been isolated from the bacteria and from the medium on which they were grown a pure protein substance which produces the skin reaction typical of tuberculin. It has also been shown that a certain fat fraction stimulates the growth of the monocyte (the cell in which the tubercle bacillus

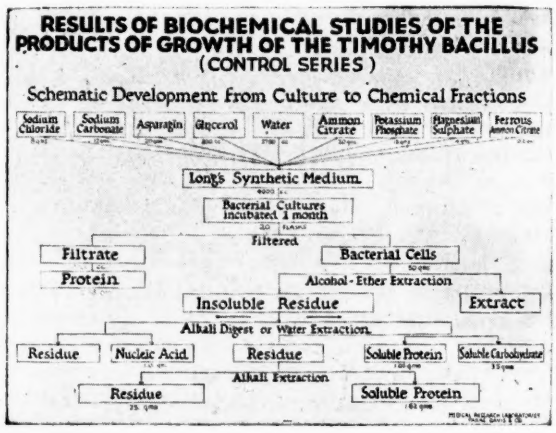

Chart illustrating fractioning of timothy bacillus (control series).

—*Courtesy Parke, Davis & Co.*

grows and is conveyed) far beyond the rate of growth of other cells. It has further been demonstrated that the sugar fractions or polysaccharides of the tubercle bacillus are chiefly responsible for the fever and rapid pulse and that they possess a killing power for tuberculous animals. It appears also that it is the polysaccharides which determine the distinctions between the human, bovine, and avian types of tubercle bacillus. The task of testing and classifying the biologic effects of all the types of bacillus is still in its early stages.

CHEMISTRY OF BODY CELLS

The changes in living cells brought about by the action of the tubercle bacillus are being studied by R. S. Cunningham at Vanderbilt University. The fact that tuberculosis is finally a problem of the living chemistry of the tubercle bacillus in symbiotic existence with the living chemistry of body cells has led to this attempt to study the influences of various substances on the several types of cells composing the body. Supplementing Dr. Cunningham's work, Eugene F. DuBois and Paul Reznikoff of Cornell University are making a comparative record of the respiration rate of the living tubercle bacilli and of body cells, both before and after infection with tubercle bacillus. (Comment: If, for example a means could be found for disturbing or disrupting the synchronism of the respiration rate of the tubercle bacillus and the monocyte, which is the host of the bacillus, the bacillus would probably perish before it had been conveyed to the soil on which its growth is possible.)

Ross G. Harrison and George A. Baitsell of Yale University are carrying on a study of scar tissue production, which is so important a factor in tubercle production. "It would now appear," they report, "that the finer chemistry of the development of the fibrils in the ground substances and fluids of the body has many points in common with the fibrillation of gelatin and blood clotting."

LATENT TUBERCULOSIS

A study of latent tuberculosis was started by Eugene L. Opie at Washington University in 1923. Shortly after, Dr. Opie removed to Phipps Institute, where research in childhood type of tuberculosis is being continued as a contribution to the group project. Another study is being made at Johns Hopkins Hospital by E. A. Park on tuberculosis in infancy.

L. Van Es at the University of Nebraska Agricultural College is studying the distribution of avian tuberculous infection in mammals other than swine.

Ernest L. Walker of the University of California investigated the therapeutic value of chaulmoogra oil, which study was discontinued when it was proved that this remedy, so potent in leprosy, has no effect on tuberculosis.

In his conclusions, the author states: "The work, although now pursued for a number of years, may still be considered to be in its infancy. Whither it leads, it would be idle to speculate. I believe it is no breach of confidence to say that in a recent statement to me Dr. Sabin remarked that she did not know when she had been so deeply thrilled as by the possibilities of this extensive study and the results toward which it might be leading."—*Research in Tuberculosis, Kendall Emerson, M.D., Jour. of the A. M. A., Mar. 15, 1930, Vol. 94.*

THE DEDICATION OF THE SIXTH HEALTH UNIT IN BOSTON

Dedication exercises were held at the opening of the Sixth Health Unit established through the George Robert White Fund, on Monday, September 15, 1930, in the auditorium of the new Unit at Blossom and Parkman streets, Boston. A company of some three hundred filled the auditorium of the new Unit to overflowing. General Edward L. Logan, Manager of the White Fund, presided.

The invocation was delivered by Rabbi Samuel J. Abrams of Temple Ahabei Shalom.

The architects of the new Unit, Coolidge, Shepley, Bulfinch & Abbott, were represented by Lewis B. Abbott who, with an appropriate speech, presented the keys to the Trustees of the Fund.

Hon. Henry I. Harriman, President of the Boston

Chamber of Commerce and a member of the Trustees of the White Fund, received the building and in turn formally presented it to the City of Boston.

Hon. James M. Curley, Mayor of the City of Boston, accepted the gift on behalf of the City. Mayor Curley reminded the audience that the whole plan of health units in Boston was conceived at a meeting held about fifteen years ago with Dr. Richard Cabot, Health Commissioner, Dr. Francis X. Mahoney and Dr. Charles F. Wilinsky, Deputy Commissioner. The original health unit the Mayor said was established in 1915 near the site of the new Blossom Street Unit. It was an experiment but was so successful that it was made permanent and was the beginning of a series of health units which have been copied not only in many of the cities in America but in some of the large cities of Europe, South America and Australia. Mayor Curley paid a touching tribute to the late George Phelan who was for a number of years Manager of the Fund.

A touch of color and added interest was lent to the affair by the presence of His Lordship, Honorable Reuben Salter, Mayor of Boston, England, who was introduced to the audience by Mayor Curley.

The Mayor also introduced Lt. Governor Honorable Hugh McLean of New Brunswick, a visitor in Boston for the Tercentenary Week.

Dr. Francis X. Mahoney, Health Commissioner, emphasized the fact that the health units established under the White Fund were educational institutions and function for the training of the public in an understanding and practise of health conservation. Commissioner Mahoney drew a contrast between the manner in which public health measures were received in the early days and the almost universal endorsement of them now. He cited the instance of the first milk inspectors of the City of Boston who went up into the country to inspect the sources of the milk supply. These inspectors were often greeted by the farmers with much hostility and some of them were attacked with pitchforks. Dr. Mahoney pledged the full facilities of his Department to making the Blossom Street Health Unit as successful as its predecessors have been.

Dr. Charles F. Wilinsky, Deputy Health Commissioner, who is in immediate charge of the work of the health centres, paid a tribute to the memory of George Robert White for making the health units possible and to Mayor Curley for his unflagging support in establishing and building up the health unit system of the city.

Hon. John I. Fitzgerald, member of the City Council of Boston who represents the district in which the new health unit is located, told of the beneficial results to the district from the original Blossom Street Unit and of the efforts to have the new building located in the district. Mr. Fitzgerald paid an eloquent tribute to the physicians and surgeons who through many years have given freely of their services to the people of the West End.

The dedicatory address of the day was delivered by Lee K. Frankel, Ph.D., Vice-President of the Metropolitan Life Insurance Company. Arrangements are being made to publish this address in a later issue of this *Journal*.

The benediction was pronounced by Reverend Charles P. Heaney, Pastor of St. Joseph's Church, Boston.

Following the formal exercises a luncheon for the speakers and other distinguished guests was held at Hotel Ritz-Carlton. At this luncheon Dr. Milton J. Rosenau of Harvard Medical School was one of the speakers.

A PRIZE ESSAY ON "THE FUTURE OF MEDICINE"

A few months ago the Editors of *Clinical Medicine and Surgery* of North Chicago, invited American physicians to contribute essays on "The Future of Medicine," in competition for a first, second and third prize.

A number of manuscripts were received and published in the July issue of *Clinical Medicine and Surgery*. The judges were the readers of the magazine.

The ballots had to be in by August 30 and the awards have now been made as follows:

First prize—S. Adolphus Knopf, M.D. (Univ. N. Y. and Paris), New York.

Second prize—Edward H. Ochsner, B.S., M.D., F.A.C.S., Chicago.

Third prize—J. Lewis Webb, M.D., Chicago.

PLANS FOR 1930 SEAL SALE

According to present prognostications the 1930 or 24th annual Christmas seal sale will be put over with many new features and more than the usual enthusiasm. In spite of the stock market slump, non-employment, lack of rain—which all have their influence on the public mind when it comes to answering the call for funds to be used in a work like ours—the present economic trend is not felt to be gloomy by many authorities on economic conditions. The very fact that the gift unit is small in the seal sale is in our favor. In 1929, even in the face of the public's pessimistic state of mind, people gave quite as liberally to our work as they had in the past. The total seal results were $5,534,297.78. There is no reason to suppose that the seal sale of 1930 will not be a success.—*Bulletin National Tuberculosis Association.*

WEEKLY HEALTH INDEX

Telegraphic returns from 77 cities with a total population of thirty-four million for the week ending August 30, indicate a mortality rate of 10.3 as against a rate of 10.4 for the corresponding week of last year. The highest rate (18.4) appears for Denver, Colo., and the lowest (4.5) for Fort Worth, Tex. The highest infant mortality rate (136) appears for Denver, Colo., and the lowest for Lowell, Mass., New Bedford, Mass., Spokane, Wash., and Tacoma, Wash., which reported no infant mortality.

The annual rate for 77 cities is 12.3 for the thirty-five weeks of 1930, as against a rate of 13.1 for the corresponding weeks of 1929.—*Department of Commerce.*

CORRESPONDENCE

A CRITICISM AND A SUGGESTION

Editor of the *N. E. Journal of Medicine,*

Dear Sir:

Having been unfortunate enough to contract a mild attack of influenza I was forced to keep abed for one day and, while so doing, the following thoughts came to my mind. As you will notice one is a criticism, and one a constructive thought.

First, I had occasion to read awhile ago in your journal an article on Vincent's Angina.* I have forgotten the author's name and outside of a few essentials I have forgotten most of the text. The one thing I cannot forget is that he recommended a preparation named Vince, as he said, an excellent preparation of sodium perborate. Since he wrote this article I and perhaps a number of other doctors have been receiving biweekly a sample of this excellent compound. I have not a copy of the New and Non-official preparations but I know that it is not acceptable because its name stands for a simple chemical which does not need a nickname. How did your editorial staff allow such an exploitation of the medical profession? The author, unwittingly I hope, named this preparation and at the same time the profession began to receive pretty blue boxes to hand to patients and each box had full directions and endorsements. I, as a subscriber, object to the use of the *Journal* as a builder of patent medicines. If your staff allows this to get by they are deficient in their duties. I have been through the aspirin campaign and don't care to pay for a Vince Journal. That article was for the general practitioner's eyes and he is the one that hasn't time to tear the wrapper off the can. I asked a leading druggist if he kept sodium perborate and he said yes and he also had to stock Vince although he knew that both were identical. As he had Merks I could not see how it could be bettered by naming it Vince. Why did the author bring in this Vince? Isn't it just as easy to write sodium perborate and put in a few drops of peppermint? It's a shame after all the hard work of the A. M. A. to keep the drugs pure from deceit.

Second, after this was out of my system I felt better and in looking over some old numbers of the *Journal* I saw quite a few articles that I wanted to save for future reference. I cut these out as it is hard to file and sort out the entire *Journal.* It came to my mind that it would be a good idea at the end of each month, or as convenient, to send out to those that asked for them, a copy of whatever article they were interested in. This could be done at a small cost and would preserve the reference in better shape. At present I receive at various times articles and reprints, in some of which I am not interested and so they are wasted.

In conclusion I wish to warn the profession to beware of this infringement on their generosity, read the wrapper and can that is sent you and if you want to advertise this preparation hand it to your patient if not throw it in the wastebasket.

Sodium perborate is good enough for anyone and doesn't need any Sunday hat. Thanking you.

PAUL NETTLE, M.D.

Bradford, Mass.

**New England Journal of Medicine,* Vol. 202, No. 16, page 768.

ARTICLES ACCEPTED BY THE AMERICAN MEDICAL ASSOCIATION COUNCIL ON PHARMACY AND CHEMISTRY

535 North Dearborn Street, Chicago, Ill.
August 29, 1930.

Managing Editor,
The *New England Journal of Medicine:*

In addition to the articles enumerated in our letter of July 26 the following have been accepted:

International Vitamin Corporation
I. V. C. Vitamin Concentrate of Cod Liver Oil.

National Drug Co.
Antimeningococcic Serum.

Parke, Davis & Co.
Gas—Gangrene Antitoxin (Combined) Refined and Concentrated.
Soluble Gelatin Capsules Parke, Davis & Company's Standardized Cod Liver Oil, 10 minims.
Soluble Gelatin Capsules Parke, Davis & Company's Standardized Cod Liver Oil, 20 minims.
Soluble Gelatin Capsules Parke, Davis & Company's Standardized Cod Liver Oil, 2.5 Gm.
Soluble Gelatin Capsules Parke, Davis & Company's Standardized Cod Liver Oil, 5 Gm.

G. D. Searle & Co.
Chiniofon-Searle
Tablets Chiniofon-Searle, 0.25 Gm. (4 gr.)

C. M. Sorensen Co., Inc.
Inhalant Chloretone Creosote and Eucalyptol-Sorensen

Spicer & Co.
Tartro-Quiniobine
Tartro-Quiniobine Ampules, 2 cc.

White Laboratories, Inc.
White's Cod Liver Oil Concentrate

Nonproprietary Articles
Quinine Bismuth Iodide
Sodium Potassium Bismuthyl Tartrate

The following article has been exempted and included with the List of Exempted Medicinal Articles (New and Non-official Remedies, 1930, p. 477):

C. M. Sorensen Co., Inc.
Inhalant Pine Camphor and Eucalyptol-Sorensen

Yours truly,
W. A. PUCKNER, *Secretary,*
Council on Pharmacy and Chemistry.

NEWS ITEMS

APPOINTMENT OF DR. H. EDWARD MacMAHON TO THE POSITION OF PROFESSOR OF PATHOLOGY AND BACTERIOLOGY OF TUFTS MEDICAL AND DENTAL SCHOOLS—Dr. MacMahon comes from London, Ontario, receiving his A.B. and M.D. degrees from the University of Western Ontario. He interned at the Montreal General

Hospital and began his work in pathology there. He spent three years with Dr. Mallory in the Pathological Department of the Boston City Hospital. For the past fifteen months he has been studying in Germany at the Institutes of Pathology in the Universities of Hamburg and Berlin. He has contributed to the *American Review of Tuberculosis*, *Medical Clinics of North America* and *American Journal of Pathology*, serving as assistant editor of the latter Journal for a year.

THE PETITION OF DR. J. N. TESSIER FOR REINSTATEMENT BY THE BOARD OF REGISTRATION IN MEDICINE—Dr. Joseph N. Tessier of New Bedford, Mass., whose registration as a physician in Massachusetts was revoked several years ago appeared before the Board of Registration in Medicine and asked to have his registration restored, Thursday, September 11, 1930.

The Board declined to grant his request.

NOTICES

WANTED

The address of Ernest Gregory, because mail is accumulating in this office for him.

CLINICS AT THE PETER BENT BRIGHAM HOSPITAL OPEN TO THE MEDICAL PROFESSION

Beginning on Thursday, October second, and continuing on Thursdays through May 1931, at 3:30 P. M. in the amphitheatre of the Peter Bent Brigham Hospital there will be a series of amphitheatre clinics open to the general profession without fee or the formality of registration.

These clinics during the year will cover Diseases of the Stomach, of the Intestine, Gall Bladder, the Liver, Bones, Muscles, the Endocrine Glands, and Disturbances of Metabolism. In addition striking or unusual conditions will be shown as they occur in the hospital.

These clinics will be conducted by Dr. Henry A. Christian, Hersey Professor of the Theory and Practice of Physic, Harvard Medical School, and Physician-in-chief of the Peter Bent Brigham Hospital, Boston, Mass.

NOTICE OF EXAMINATION FOR ENTRANCE INTO THE REGULAR CORPS OF THE UNITED STATES PUBLIC HEALTH SERVICE

Examination of candidates for commission as Assistant Surgeon in the Regular Corps of the U. S. Public Health Service will be held at the following-named places on the dates specified:

At Washington, D. C., November 3, 1930.
At Chicago, Ill., November 3, 1930.
At New Orleans, La., November 3, 1930.
At San Francisco, Cal., November 3, 1930.

Candidates must be twenty-three years and not over thirty-two years of age. They must have been graduated in medicine at a reputable medical college, and have had one year's hospital experience or two years' professional practice. They must satisfactorily pass oral, written, and clinical tests before a board of medical officers, and undergo a thorough physical examination.

Successful candidates will be recommended for appointment by the President, with the advice and consent of the Senate.

Request for information or permission to take this examination should be addressed to the Surgeon General, U. S. Public Health Service, Washington, D. C.

H. S. CUMMING, *Surgeon General.*

UNITED STATES CIVIL SERVICE EXAMINATIONS

The United States Civil Service Commission announces the following open competitive examinations:

Social Worker (Psychiatric), $2,000 a Year
Junior Social Worker, $1,800 a Year.

Applications for social worker (psychiatric) and junior social worker must be on file with the United States Civil Service Commission, Washington, D. C., not later than December 30, 1930.

The examinations are to fill vacancies in Veterans' Bureau hospitals throughout the United States.

The entrance salaries are as stated above. Higher-salaried positions are filled through promotion.

The duties will be to investigate history and environmental conditions of patients; to analyze and submit data to the physician to aid him in arriving at a definite diagnosis and in outlining a course of treatment; to consider, report upon, and treat the social environment to which a convalescent patient may go or be expected to go.

Also Medical Officer
Associate Medical Officer
Assistant Medical Officer

Applications for medical officer, associate medical officer, and assistant medical officer must be on file with the United States Civil Service Commission, Washington, D. C., not later than December 30, 1930.

These examinations are to fill vacancies in the Veterans' Bureau, Public Health Service, Coast and Geodetic Survey, Panama Canal Service, and Indian Service.

Full information may be obtained from the United States Civil Service Commission, Washington, D. C., or from the Secretary of the United States Civil Service Board of Examiners at the post office or customhouse in any city.

LAWRENCE CANCER CLINIC

There will be a Demonstration Clinic with a Boston consultant in attendance, upon the occasion of the regular session of the Lawrence Cancer Clinic, at the Lawrence General Hospital, 1 Garden Street, Lawrence, Massachusetts, on Tuesday, October 7, at 10 A. M. sharp.

Physicians in the jurisdiction of Essex North District Medical Society are invited to be present, and to bring or send cases for diagnosis and advice. The profession in general will be welcome.

J. Forrest Burnham, M.D.,
Chairman for the Committee.

NOTICES OF MEETINGS

The Massachusetts Medical Society

STATED MEETING OF THE COUNCIL

There will be a stated meeting of the Council in John Ware Hall, Boston Medical Library, Wednesday, October 1, 1930, at 12:00 o'clock noon.

Business:

1. Reading record of last meeting in abstract.
2. Report of Committee of Arrangements.
3. Report of Committee on Membership and Finance.
4. Petitions for restoration to Fellowship.
5. Report of Committee to consider the registration laws of the various states.
6. A revised list of medical schools and colleges as required by the By-Laws from candidates for Fellowship, submitted by the Committee on Medical Education and Medical Diplomas.
7. Consideration of the report to the Council, June 17, 1930, of the Committee on Clinics, Health Associations, and Industrial Clinics.

   As regards these the Chair summarized the three recommendations from the report as follows: 1. The Committee suggests that the Council should direct that a copy of the earlier part of this report be sent to the special Clinics and Health Associations, and Industrial Clinics of this State. 2. As aids to the effective and happy coördination of the activities of the health agencies and practicing physicians, the Committee makes two recommendations. (a) As far as possible, the Medical Society, or its branches, should undertake the medical responsibility, or at least supervision, of these special clinics. (b) The Medical Society, should in every way possible develop activities looking toward postgraduate instruction of the profession. The report in full appeared in the Proceedings of the Council in the *New England Journal of Medicine,* issue of July 10, 1930.

   (Note). No suggestions with reference to this report have been received by the Secretary in accordance with the vote of the Council.
8. Report of Committee to consider what changes if any are necessary or desirable in the boundaries of the Bristol North and Plymouth Districts.
9. Appointment of Auditing Committee.
10. Incidental Business.

Walter L. Burrage, *Secretary.*
Brookline, September 24, 1930.

AMERICAN PUBLIC HEALTH ASSOCIATION

Two hundred speakers will address the fifty-ninth annual convention of the American Public Health Association in Fort Worth, Texas, October 27-30.

Health Officers, Sanitary Engineers, Physicians, Scientists, and others, from all parts of U. S., Canada and Mexico will attend.

44 Sessions will be held on Epidemic Control, Disease Prevention, Child Hygiene, Public Health Engineering and Industrial Hygiene, including Symposiums on Meningitis, Atmospheric Pollution, Undulant Fever, Metals in Foods, and Typhoid.

Manufacturers' Exhibit of Products and Equipment used by Health Departments will be an important feature of the Convention.

Other features will be a Texas Barbecue and Rodeo, inspection trips to local water and sewage disposal plants and hospitals, special trips to other Texas cities and a nine-day all-expense tour to Mexico City upon invitation of Mexican Public Health authorities.

SOCIETY MEETINGS, CONGRESSES AND CONFERENCES

March-October — International Medical Postgraduate Courses in Berlin. Complete notice appears on page 853, issue of October 24, 1929.

September 26-27—New England Surgical Society. Detailed notice appears on page 611, issue of September 18.

October 13-17—Clinical Congress of the American College of Surgeons. Complete notice appears on page 1175, issue of June 12.

October 20-24—International Assembly of the Interstate Postgraduate Medical Association of North America. Detailed notice appears on page 291, issue of August 7.

October 20-31—Third Graduate Fortnight of the New York Academy of Medicine. Detailed notice appears on page 547, issue of September 11.

October 22, 23, and 24—The Annual Convention of the American Academy of Physical Therapy. Complete notice appears on page 498, issue of September 4.

October 27-30—The American Public Health Association. Detailed notices appear on page 1271, issue of December 19, 1929, page 547, issue of September 11, and elsewhere on this page.

March 23-27, 1931 — Fifteenth annual clinical session of the American College of Physicians. Detailed notice appears on page 790, issue of April 17.

July 27-31, 1931—Third International Congress of Radiology, Paris. Complete notice appears on page 385, issue of August 21.

DISTRICT MEDICAL SOCIETIES

Bristol North District Medical Society

April 16, 1931—Taunton Woman's Club.
September 17, 1931.

Franklin District Medical Society

November, 1930-May, 1931—The meetings are held on the second Tuesdays of November, January, March and May at 11 A. M. at the Weldon Hotel, Greenfield.

Middlesex East District Medical Society

October 8—Joint meeting with Middlesex North and Essex North and South.

November 12—New England Sanitarium and Hospital, Stoneham.

January 14, 1931—Harvard Club of Boston.

March 11, 1931—At Reading.

May 13, 1931—At Wakefield.

Middlesex South District Medical Society

September 25—Fall Tournament of the Middlesex South District Medical Golf Association. Detailed notice appears on page 612, issue of September 18.

BOOK REVIEWS

Tuberculosis Among Children. By J. ARTHUR MYERS, M.D. Published by Charles C. Thomas, 220 E. Monroe Street, Springfield, Ill. Price, $3.50.

This volume is a short, concise book of some 200 pages, excellent plates, very complete bibliography at the end of each chapter, well printed and gotten out in every way. The following extracts from Dr. Myers' preface give the general idea of the book and the nature of the plea which he makes in it. For instance, "Just as long as children, who have been exposed to tuberculosis, are neglected there will continue to be a crop of tubercle bacilli causing great destruction among young adults and spreading to the bodies of more children". "In the period of infancy and childhood lies the fountain head of tuberculosis". "The minds of children are impressionable and retentive. Therefore, the teachings of physicians not only register but also remain throughout the life of the individual".

The book is divided into three parts. The first part is in seven chapters and considers, "Congenital Tuberculosis", "Exposure to Tuberculosis and Tuberculous Infection", "Diagnosis of Tuberculous Infection", "Allergy and Immunity", "Childhood Type of Tuberculosis in Infancy", "Other Forms of Tuberculosis in Infancy . . . and their Prevention" with a special chapter by Dr. C. A. Stewart on "Tuberculous Meningitis". Part Two in five chapters takes up tuberculosis in childhood under the headings: "Incidence of Tuberculous Infection in Childhood", "Tuberculous Lesions in the Chest in Childhood . . . and Other Lesions" with special chapters by Dr. Paul W. Giessler on "Tuberculosis of the Bones and Joints" and by Dr. C. A. Stewart on "Chronic Non-Tuberculous Basal Pulmonary Diseases in Childhood". In this chapter Dr. Stewart states that "a coexisting bronchiectasis usually requires the intratracheal" (the word being spelled wrong in the book) "introduction of iodized oil for its demonstration". The majority of physicians would agree with the reviewer that a diagnosis of bronchiectasis should be perfectly possible and easily made without going through the unpleasant procedure of iodized oil. He calls attention to the very important fact that diseased sinuses are found in practically 100 per cent. of the children having chronic non-tuberculous basal pulmonary disease. He does not mention tonsils and adenoids which most of us believe to be of equal importance. In Part Three, consisting of four chapters, Dr. Myers discusses "Tuberculous Infection in the Teen Ages", "Tuberculous Lesions in the Chest during the Teen Ages", "A Family Disease", and "Some Dangers to Children from Tuberculosis Among Elderly People".

He is firmly convinced of the value of a negative tuberculin test in ruling out tuberculosis in any form not only in children but in adults and elderly people. Despite his quotations from Dr. Allen Krause supporting this view, many physicians are of the opinion that clinical evidence with repeated examinations and a carefully conducted history-taking are of infinitely more value than a negative tuberculin test except in children.

On the whole, however, the book is an excellent one and should prove of the greatest value in every way.

Handbook of Pediatric Procedures. By FRANCIS SCOTT SMYTH, M.A., M.D., Associate of Pediatrics, University of California; Pediatrician-in-chief, University of California Hospital and Out-Patient Department; and EDITH I. M. IRVINE-JONES, M.B., Ch.B., Instructor in Pediatrics, Washington University School of Medicine; Assistant Physician, St. Louis Children's Hospital, etc. The Macmillan Company, New York. Price $2.50.

This handbook, covering the physical examination, laboratory diagnosis and therapeutic procedures in pediatrics will be gratefully received by those who, like the reviewer, have hopelessly searched first their memories and then a five-foot shelf of text books to find the proper concentration and amount of magnesium sulphate to use in tetanus or the exact method of citrating blood for a transfusion.

Diagnosis and treatment have become so technical that now none but the hospital house officers can remember them all out of hand. The rest of us, unless we are memory prodigies, are bound to forget the details of procedures which we are rarely called upon to employ. This compact little book comes like a guiding light in the wilderness.

Minor Surgery. By ARTHUR E. HERTZLER and VICTOR E. CHESKY. Second Edition. Published by C. V. Mosby Company. Price $10.00.

This is a very carefully prepared and very complete work on the subject. It is profusely illustrated with very excellent illustrations and is written in an unusually clear and concise manner. Unfortunately, however, the book is open to the same criticism as most of the older books on the subject. In order to insure perfect completeness, the authors have included many subjects which do not properly fall under the head of minor surgery and would be better considered under major surgery or in a textbook on the specialty to which they belong. The inclusion of these subjects have forced the authors to be a little too brief in their discussion of the treatment of some minor surgical lesions. Nevertheless, it is an excellent book of reference and there should be a place for it on every physician's book shelf.